



Comprehensive  
Cancer Center

# Ensuring AI Solutions Improve the Lives of People at Risk or Diagnosed with Cancer

**Cheryl L. Willman, MD**

The Stephen and Barbara Slaggie Executive Director  
Mayo Clinic Cancer Programs and Comprehensive Cancer Center  
The David A. Ahlquist, M.D. Professor in Cancer Research

National Cancer Policy Forum: Policy Issues for Integrating  
AI in Cancer Research and Care | March 9-10, 2026

# Transforming Cancer Research and Practice

## Mayo Clinic Platform (MCP), Generative AI, and AI Agents

**MCP\_Connect: Distributed Global Data Network Partners**  
**4 of the World's Top 10 Health Systems**  
**54M Longitudinal De-Identified Patient Records**

**Mercy**† **Community Health System:**  
 MO, AK, OK, KS

**SHEBA** **Tel HaShomer City of Health**  
 \* Israel: Largest Middle East Health System

**UHN**  
 \* Canada, U Toronto, Princess Margaret Cancer Centre

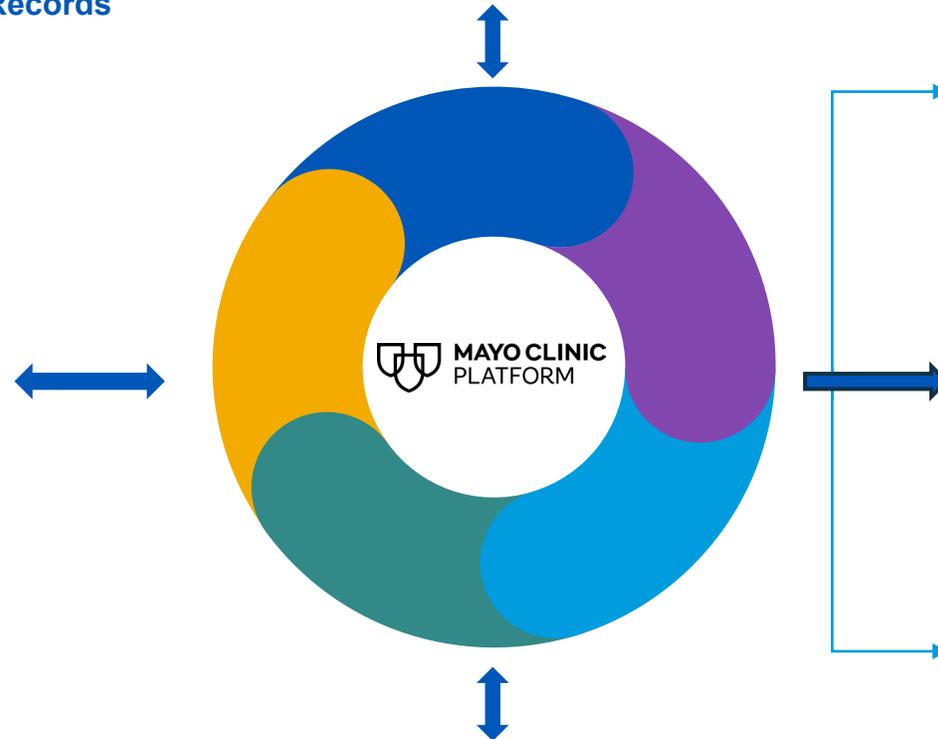
**HOSPITAL ISRAELITA ALBERT EINSTEIN**  
 Sao Paulo, Brazil

**SNUH**† **Seoul, South Korea National Cancer Hospital**

**SingHealth**  
 Defining Tomorrow's Medicine  
 \* Singapore National Cancer Centre

**THE AGA KHAN UNIVERSITY**  
 Pakistan, Uganda, Kenya, Tanzania

**100+ Solution Developer Partners**  
**Building AI, LLM, Foundational Models, and Digital Tools**



**\* MAYO CLINIC**  
**MCP\_Connect: Mayo Clinic Cloud**  
**New "Pre-EMR Data Architecture"**  
**17M Fully Digitized Longitudinal Patient Records**  
**705M Patient Encounters**  
**1.65B Clinical Notes, 670M Diagnoses,**  
**16M Digitized Pathology Images, 3.2B Lab Tests**  
**8.1B Radiographic Images: 5.4B CT, 2.3B MRI, 371M PET**

**Transforming Cancer Research**

**RESEARCH: Longitudinal Patient Records and Multimodal Data Modeling Drive Research and Cures**

**Mayo Foundation Models: Digital Pathology (Atlas Med), Digital Radiology, Genomics (Strand)**

**AI-Driven Therapeutic Target, Neoantigen, and Drug Discovery**

**LLMs for Cancer Risk Prediction, Early Cancer Detection & Interception, Therapeutic Targeting, Predicting Therapeutic Response (TIME)**

**"Digital Biology," AI-Virtual Cell, AI Virtual Organs, Digital Twins**

**Mayo Clinic Partners**



# Mayo Clinic Cancer Center AI and Automation Core Team



**Eric Klee, PhD**  
MCCCC Deputy  
Director, AI & Data  
Science, Research



**Lisa Morelli**  
MCCCC GenAI,  
Data Science



**Matt Redlon**  
Vice President  
Digital Pathology



**Panos Korfiatis, PhD**  
Senior AI Scientist  
(Radiology)



**Zachi Attia, PhD, MBA**  
Senior AI Scientist  
(Cardiology)



**Michael Lucas, PhD**  
Lead Software  
Engineer



**Pravat Das, MS**  
Sr. Data  
Engineer



**Ben Holmes, MS**  
Sr. Software  
Engineer



**Ayushi Sinha, PhD**  
Principal Data Science  
Analyst



**Nate Erwin**  
Lead Project  
Manager



**Sarah Anderson**  
Project  
Manager



**Suzanne Lee-Trejo**  
Project  
Manager

# AI Expert Faculty Embedded in Academic Departments



**Imon Banerjee, PhD**  
Radiology



**Moritz Binder, MD,  
MPH, Hematology**



**Amye Tevaarwerk,  
MD, Oncology**



**Andrew Foong, PhD**  
Radiation Oncology



**Wenchao Han, PhD**  
CPAI



**Steven Hart, PhD**  
CPAI



**Anup Mishra, PhD,  
MS, ECD**



**Irbaz Riaz, MBBS, PhD**  
Oncology / Hematology



**Santiago Romero  
Brufau, MD, PhD**  
ENT



**David M. Routman, MD**  
Radiation Oncology



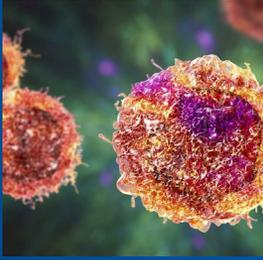
**Jansen N. Seheult,  
MB, BCh, BAO, MD**  
Laboratory Medicine  
Pathology



**Chen Wang, PhD**  
Quantitative Sciences



**Micky Tripathy, PhD**  
Chief AI  
Implementation Officer  
AI Implementation and  
Adoption (AIA) Team



# The AI-Powered Science & Discovery Awards in Cancer MCCCC, Mayo AI Program, Mayo Clinic Platform

1. **Address critically important clinical questions** to transform diagnosis, drive early detection and interception, guide therapeutic intervention, and improve patient outcomes
2. **Move Fast:** Build initial single channel and multi-modal AI models on established highly characterized patient cohorts using Mayo Clinic and other Foundation Models (**ATLAS:** Digital Pathology; **STRAND:** Genomics; Radiomics Models); Now transitioning to building reasoning models (NVIDIA collaboration)
3. **Further refine models** with sophisticated data sets: genomics (germline/somatic), proteomics, spatial transcriptomics, spatial tumor microenvironment
4. Active Large-Scale Projects:  
  
Breast Cancer, Ovarian Cancer, Pancreatic Cancer, Head and Neck Cancers, Myeloma (Smoldering Myeloma and Progressive Disease Prediction), Chronic Lymphocytic Leukemia (CLL), Cholangiocarcinoma, Lung Cancer, Prostate Cancer  
  
AI-Virtual Cell, AI- Virtual Immune Cell, AI-Virtual Organs, AI Human Digital Twin

# Digital Pathology Foundation Models

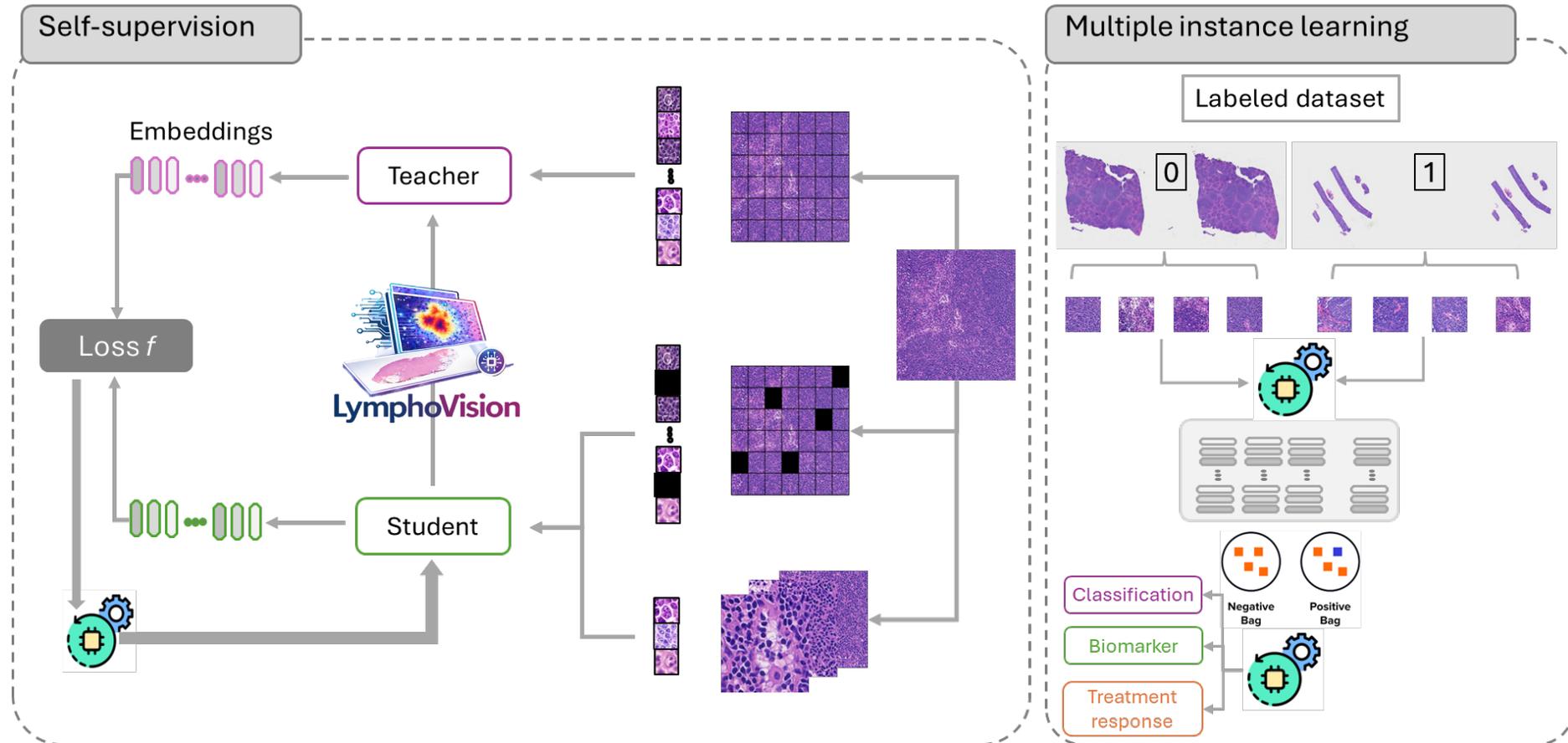
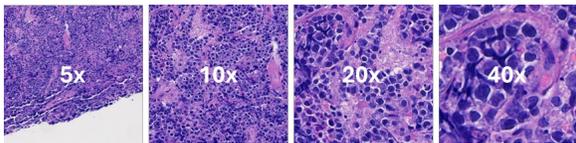
## WILSON: Breast: Prediction of Complete Pathologic Response

## LYMPHOVISION

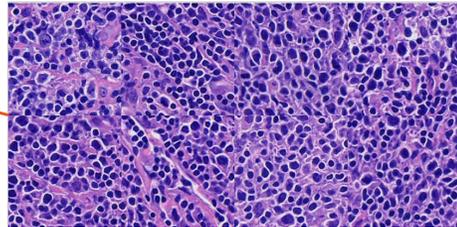
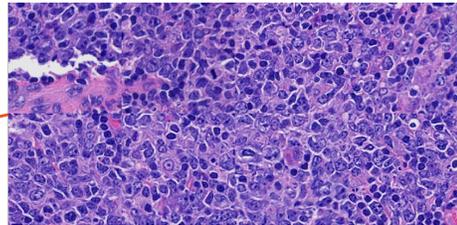
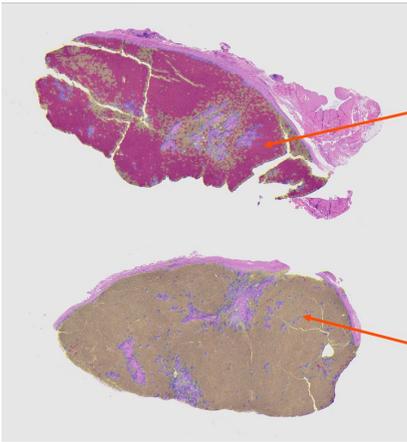
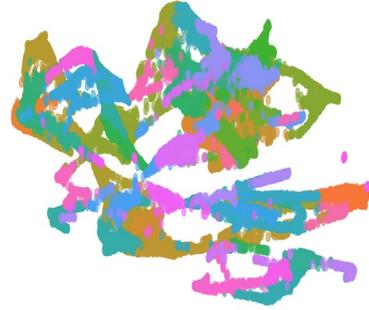
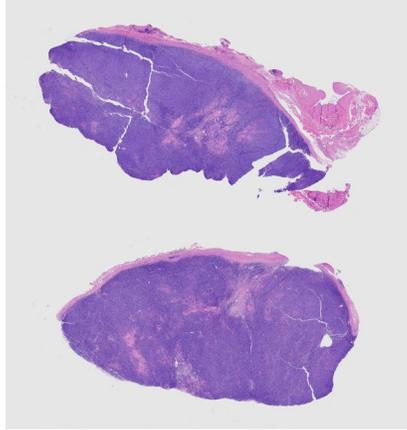
## Blood Bytes: Peripheral Smears/Aspirates: Myeloma (Progression, Response, Outcomes)

**Mayo Clinic Patients**  
Cases: 9,155  
Slides: 31,211  
Years: 2006 - 2024

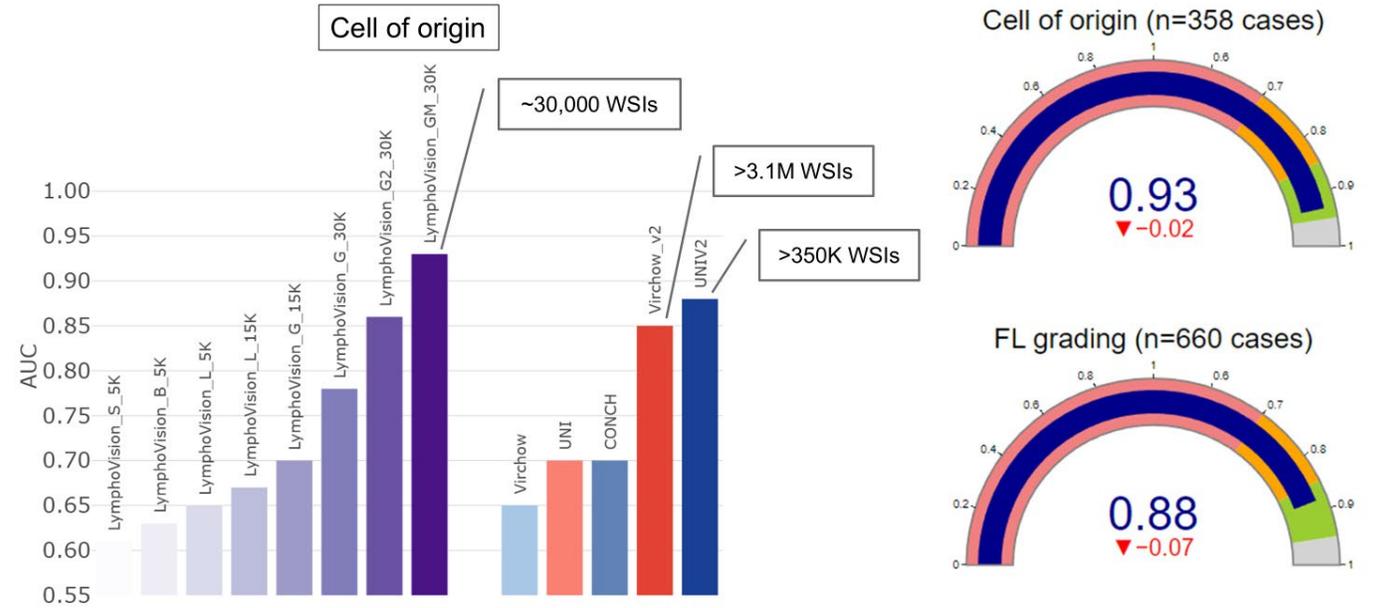
**Latest models trained with 37 million patches**  
from 31,211 H&E WSIs  
from 9,155 archival cases  
using 4 magnifications (5x, 10x, 20x, 40x)



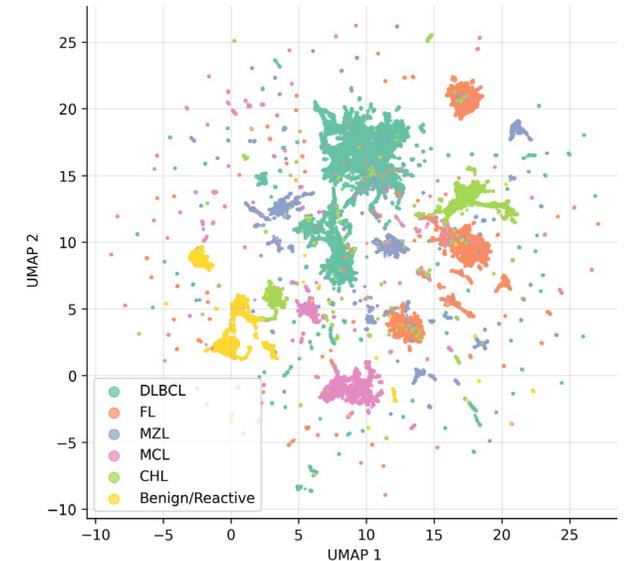
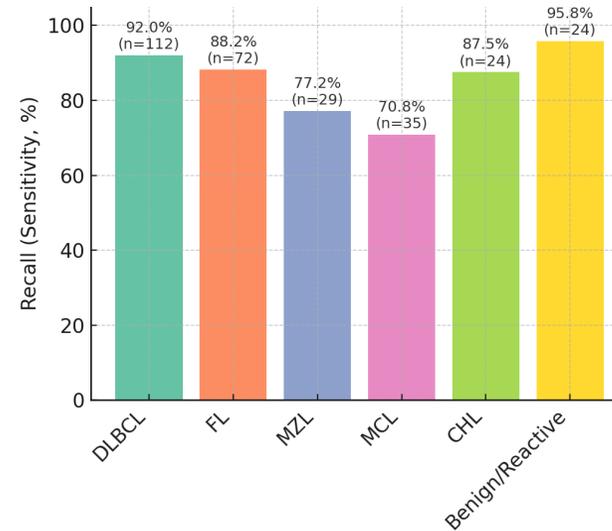
# LYMPHOVISION



## H&E-BASED MOLECULAR SUBTYPING AND GRADING



## LYMPHOMA CLASSIFICATION



# Innovative Trial Design, AI-Informed Trial Matching, Earlier Intervention, Therapeutic Targeting



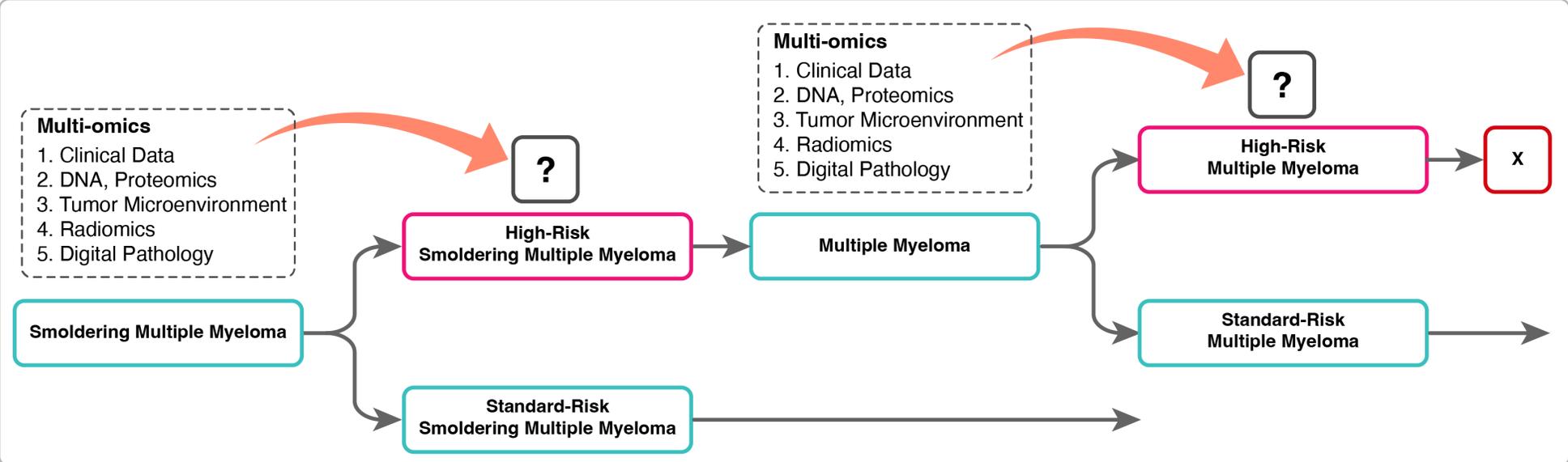
# Individualized Early Interception of High-Risk Smoldering Myeloma and Active Multiple Myeloma

Leverage innovative artificial intelligence methods and multi-omics data (genomics, proteomics, TME/spatial transcriptomics) to reliably identify patients at high-risk for adverse clinical outcomes and who will benefit from early therapeutic interventions.

The development of robust clinical prediction models with performance characteristics sufficient for clinical decision making remains a critical unmet need and the advent of powerful AI methods that allow the incorporation of high-dimensional multi-omics data makes the development of an actionable AI intelligence-based multi-omics prediction model a priority

**Aim 1: (300 Cases) To develop a novel multi-omics risk stratification model for smoldering multiple myeloma (predict risk/time to progression)**

**Aim 2: (2500 Cases) To develop a novel multi-omics risk stratification model for multiple myeloma (predict progression to early relapse mortality)**



Shaji Kumar, M.D.  
DOM/Hematology



Akhilesh Pandey,  
M.D., Ph.D. DLMP



Moritz Binder M.D.  
DOM/Hematology



Richard  
Kandasamy,  
Ph.D. DLMP



Nick J. Braun  
Ph.D. CDH



Jansen N. Sehult,  
M.B., B.Ch., B.A.O.,  
M.D. DLMP  
Hematopathology



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Cancer Center

## AI-Driven Foundation Models and Algorithms for Digital Pathology and Radiology

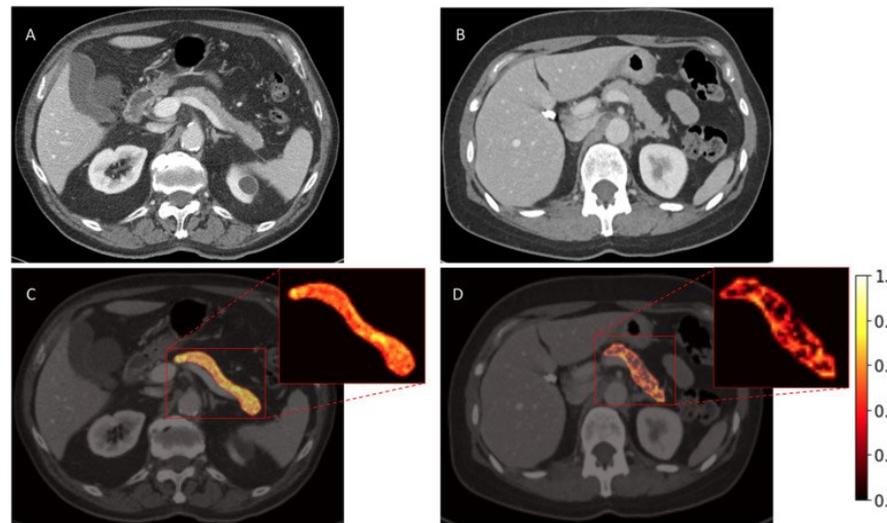
Will Transform and Democratize Access to Diagnostic  
Medicine Across the Nation and the World

*Bringing Expert, Sophisticated Diagnostics  
Anywhere at Anytime*



# Multi-modal, Multi-Step AI Algorithms for Early Detection of Visually-Occluded Pancreatic Cancer

- Developed AI-powered radiomics-based machine learning method capable of detecting visually occult pancreatic cancer in a normal-appearing pancreas on pre-diagnostic CTs at a median of 386 (97–1092) days prior to clinical diagnosis (AUC: 0.98)
- In contrast, inter-reader radiologist agreement was poor: AUC=0.66 (95% CI: 0.46–0.86; p< .001)
- Validated in an independent NIH imaging data set (96.2)
- Developed EMR-based algorithm for identification of patients with a >20-fold elevated risk



- **Launching the AI-PACED Clinical Trial: Automated Risk Stratification, Serial Artificial Intelligence-Augmented Imaging, and Biobanking for Early Detection of Pancreatic Cancer**

- 10,000 individuals with an elevated risk for PDA will be screened using an AI-driven screening algorithm: Enriching New Onset for Diabetes (**NOD**) for **Pancreatic Cancer (ENDPAC)** and other metabolic (Petersen, Chari (*Gastroenterology* 2018; 155(3):730-739)
- **Individuals with ENDPAC scores ≥3 exhibit a 20-fold increased risk of PDA within 3-years**
- Participants will undergo AI-augmented CT scans at regular intervals, serial biosampling and psychosocial support

IMPACT

**Prospective Study:** Seeks to validate the AI-based early detection approach on a large scale, with the goal of improving outcomes of sporadic PDA through earlier detection and defining modes and timing of interception



A. Goenka, MD  
(REDI/ACTS, MCR)



G. Petersen, PhD  
Deceased



S. Chari, MD  
(MD Anderson)



J. Kisiel, MD  
(REDI, MCR)



S. Majumder, MD  
(REDI, MCR)



M. Wallace, MD  
(REDI, MCA)



K. Ballman, PhD  
(ACTS, MCR)



N. Larson, PhD  
(MCR)

## Publications

Gastroenterology 2022  
Gastroenterology 2023  
Abdominal Radiol (NY) 2024

## Funding

Philanthropy

## Clinical Trials

NCT03954548

## Shared Resources

Biostatistics, Biospecimens  
Accessioning and Processing

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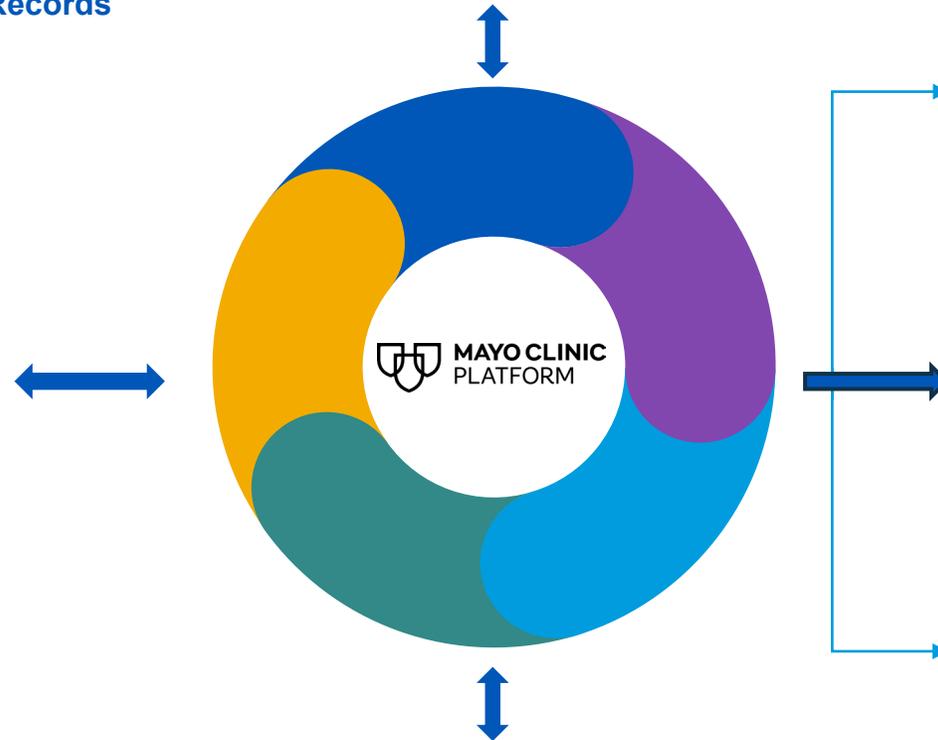
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### Transforming Clinical Trials

**CLINICAL TRIALS: Building National and Global Trial Networks**

**Accelerating Protocol Development and Activation: 14 AI Agents**  
**>70% of Trials Activated < 12 weeks**

**Innovative Trial Designs**

**In Silico, Synthetic, Emulation Trials: Protecting Our Patients**

**Precision Clinical Trial Matching**  
**Virtual Consent / Agentic Trial Assistant**

**AI, Digital Tools, Remote Therapy Delivery and Monitoring**  
**Clinical Trials Beyond Walls (CTBW)™**

### Mayo Clinic Partners





# Clinical Trials Beyond Walls™

CTBW™

Enabling Decentralized Capabilities  
for All Clinical Trials

**Tufia Haddad, M.D.**  
CTBW Medical Director

**Rebecca Kottschade, M.A.**  
CTBW Research Administrator



# Composable Capabilities Enable Flexible Trial Design

## Clinical Trials Beyond Walls



### COMMUNICATE



#### PROVIDE CONSENT

Remote Consent with Video  
Screen Sharing



#### CONTACT STUDY TEAM

Video Visit  
Phone Call  
Messaging  
Chat  
Two-Way SMS

### CONNECT



#### ACCESS DEVICES

Tablets  
Wearables  
Connectivity  
Device Configuration  
Device Logistics

### COLLECT



#### SHARE BIOSIGNALS

Remote Vitals and Activity Collection  
Asynchronous Remote Vitals and Activity Collection  
Live Remote Patient Monitoring  
ECG, Voice and Video Collection



#### SHARE BIOSPECIMENS

Remote Phlebotomy  
Self-collected Blood Samples  
Remote Stool, Saliva, etc. Collection



#### PROVIDE HEALTH INFO

Surveys  
eCOA  
ePROs  
Journals

### CARE



#### RECEIVE MEDICATION

Medication Delivery  
IP Delivery  
Remote Infusion

# Clinical Trials Beyond Walls – National Reach

## # of Clinical Trials

● at Mayo Clinic

**2,566 / 1,083**

## # of Clinical Trials

● with DCT Capability\*

**687**

## # of Cancer Clinical Trials

● with DCT Capability\*

**437 (40%)**

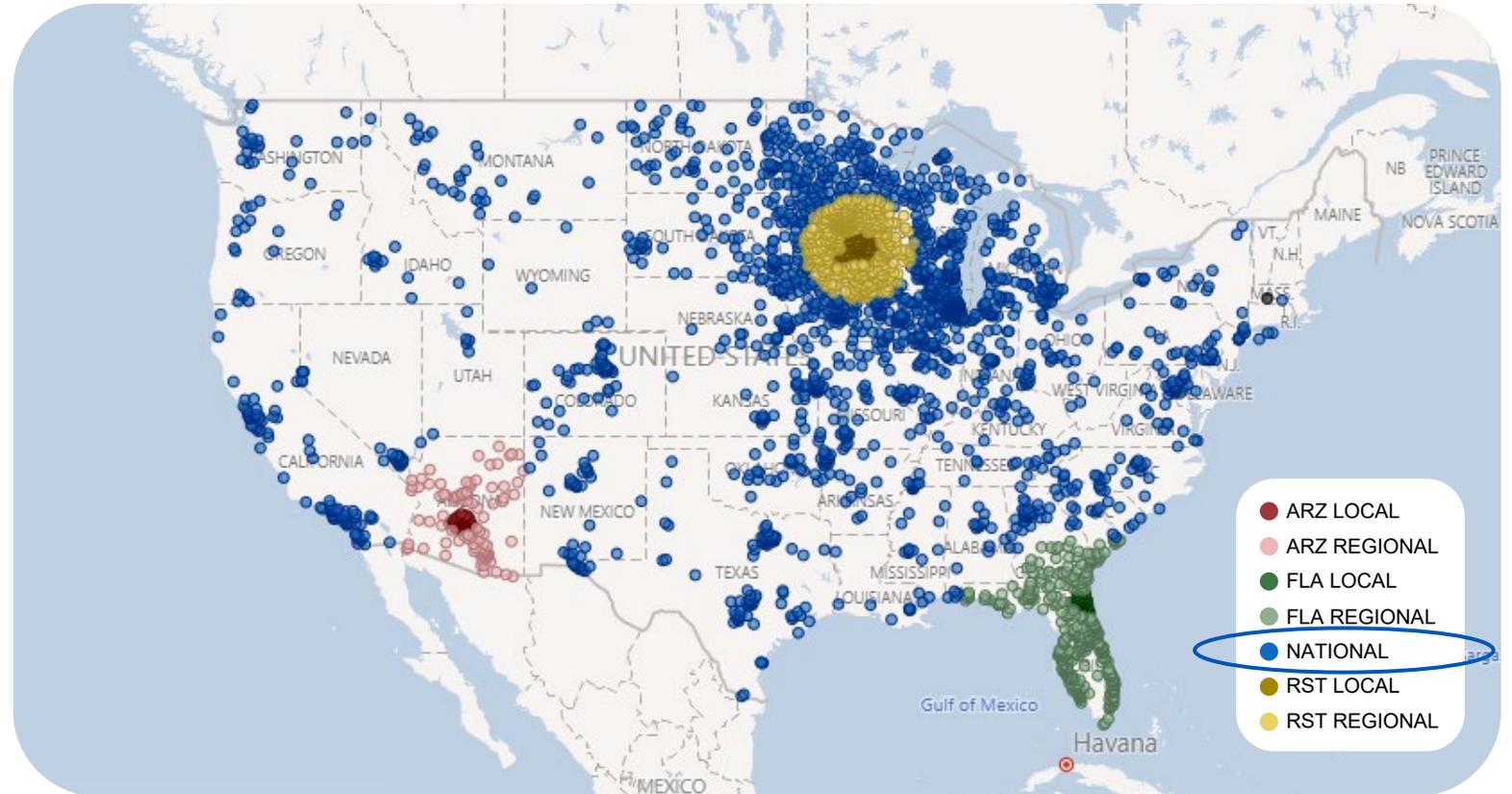
## % of National Patients

● on a study with DCT Capability

**25.7%**

\*Any capability beyond remote consent

Mayo Clinic Defined Local, Regional, & National Zip Codes w/ Participants Accrued in Decentralized Trials



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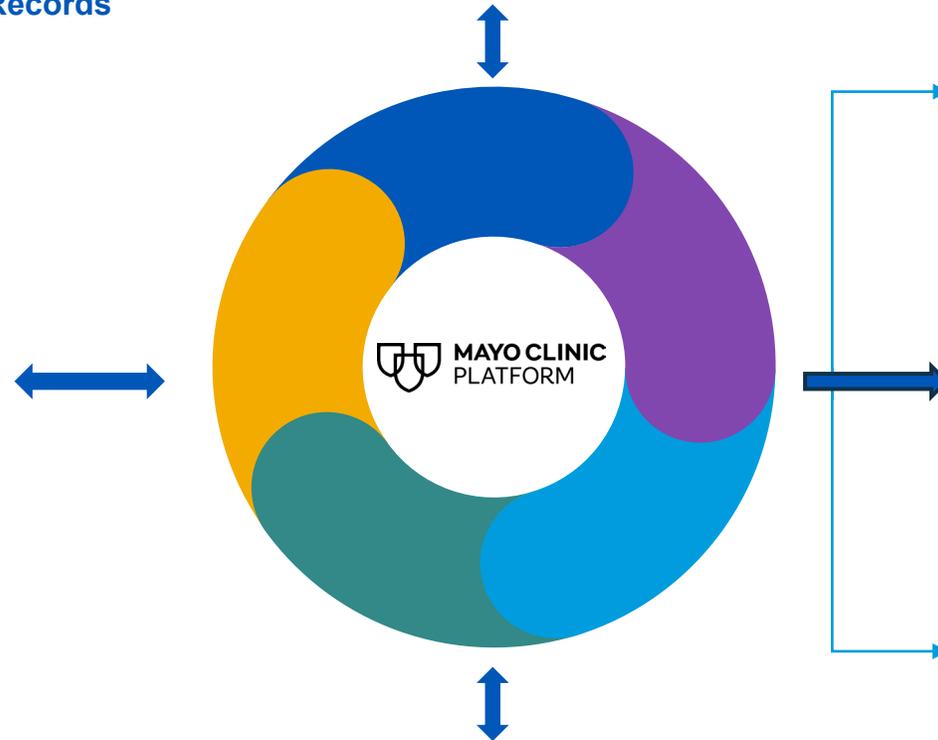
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**Transforming Clinical Practice and Care Delivery**

**AI Agents: Referral Record Summation, Multidisciplinary Clinical Scheduling, AI Virtual Assistants for Patient Navigation**

**Digital Pathology / Radiology for Precision Diagnostics**

**AI Virtual Genetic Counselors**

**AI-Driven Therapeutic Intervention: *OncoTimeLine / OncoStage (AIA)***

**AI Tumor Boards**

**Enhanced Access to Quality Care**  
**Care Delivery to Home / Communities**  
***Cancer Care Beyond Walls (CCBW)™***

**Mayo Clinic Partners**





# Cancer Care Beyond Walls™

## CCBW™

Enabling Decentralized Care in  
Home and Community Settings

**Roxana Dronca, M.D.**  
CCBW Medical Director

**Amanda Mikhail, M.B.A.**  
CCBW Research Administrator



# Transforming Cancer Care Delivery: Cancer Care Beyond Walls™

Driving Access, Health Equity, Reducing Patient Financial Burden and Toxicity

1,165 in-home chemotherapy treatments delivered to 271 patients to date in Florida;  
7 embedded clinical trials with 189 patients accrued to date



## OUTPATIENT CARE AT HOME

- Telehealth (virtual visits, remote patient monitoring/RPM)
- Home healthcare
- Supportive care/home infusion



## CHEMOTHERAPY AT HOME

- Home cancer-directed therapy (chemotherapy, immunotherapy) infusion
- Home labs
- Telehealth (virtual visits, RPM)



## SUPPORTIVE CARE AT HOME

- Palliative care
- Non-medical home care
- Virtual visits with other members of the care team (e.g. nutritionist, social worker)

### IMPACT

- A transformative project to enhance access to cancer care and health equity
- Ongoing comparative effectiveness research to assess costs and impact to promote necessary policy and reimbursement changes for in-home care
- First distant, rural site opened: **Altru** Grand Forks, North Dakota; expansion to Mayo Clinic Health System, Mayo Clinic Care Network Partners



R. Dronca, MD  
(ACTS, MCF)



T. Haddad, MD  
(ACTS, MCR)



M. Maniaci, MD  
(MCF)



J. Jones, MD  
(ACTS, MCF)



G. Colon-Otero, MD  
(CPCS, MCF)



C. Willman, MD  
(CGSM, MCR)



John Halamka, MD  
(CPCS, MCP, MCR)



Rosanna Fahy  
(MCP)

### Funding

Emerson Collective  
State of Florida Funds  
Industry Trial Support  
MCCCC Philanthropy

### Shared Resources

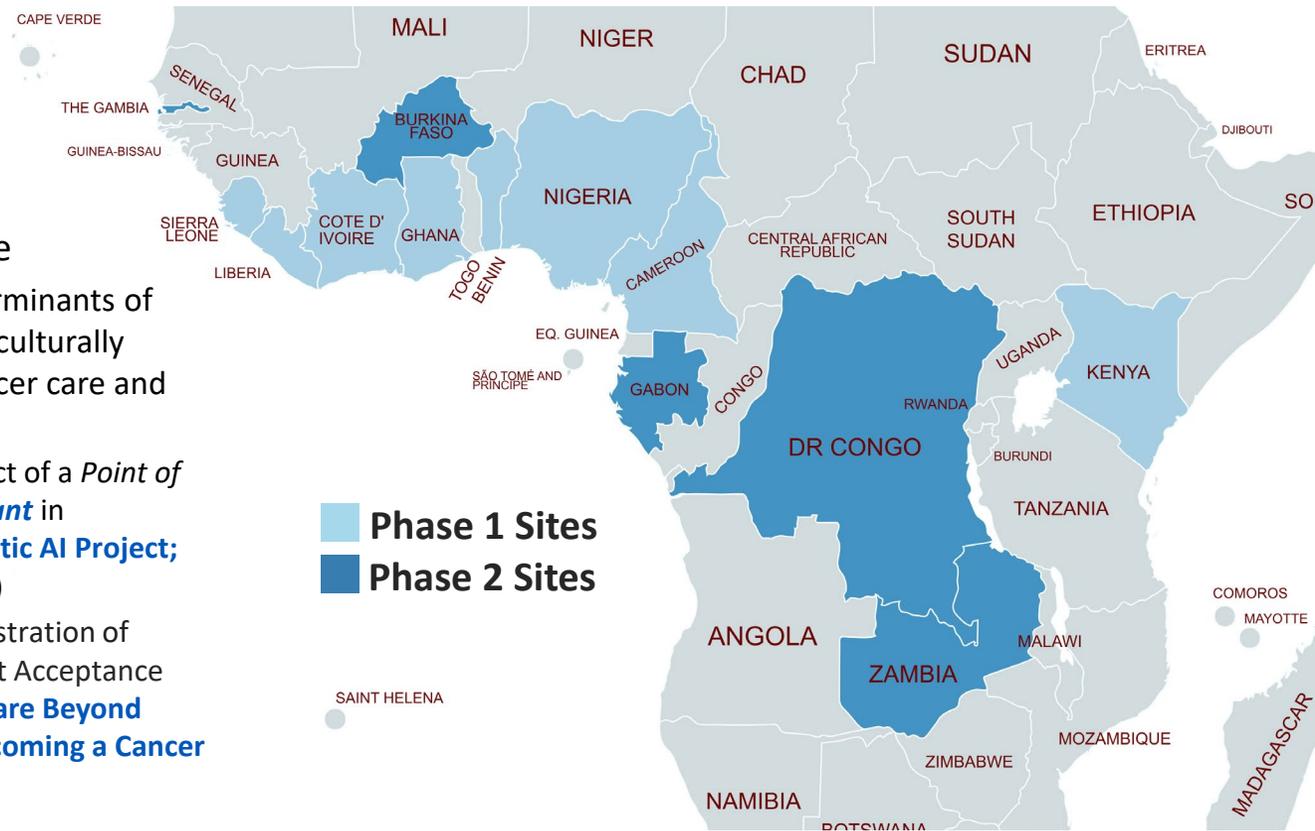
Biostatistics  
Biospecimens

Center for Digital Health  
Advanced Care at Home  
Mayo Clinic Platform

# Inclusive Cancer Care Research Equity (iCCaRE) for Black Men Consortium



## United States and Africa Sites



- **DOD HEROICA Award (\$17,671,199)**
- **Phase II: 2024-2028**
- **Global Sites:** North America, Africa , Europe
- **Project Goal:** Understand the socio-biologic determinants of prostate Cancer disparities and develop tailored, culturally responsive interventions to improve prostate cancer care and survivorship among ethnically diverse Black men
- **Project 1:** Pragmatic Clinical Trial to Evaluate the Effect of a *Point of Care Prostate Cancer Diagnosis Virtual Reality Assistant* in Supporting Newly Diagnosed Black Men (**GenAI/Agentic AI Project; Virtual Education and Supportive Care Delivery Tool**)
- **Project 2:** A Clinical Trial to Evaluate Whether Administration of Cancer Therapy in Patient Homes Increases Treatment Acceptance for Advanced Prostate Cancer in Black Men (**Cancer Care Beyond Walls Program Trial: 1<sup>st</sup> CCBW Trial Focused on Overcoming a Cancer Mortality Disparity**)



**Folakemi Odedina, PhD**  
Consortium Director  
CPCS (MCF)



**Roxana Dronca, MD**  
ACTS (MCF)



**Mr. Arnold Merriweather**  
Community Director  
Project 1 Co-Lead  
(Advocate/Survivor)



**Che Ngufor, PhD**  
(MCF)  
Project 1 Co-Lead

### 15 Countries & 9 Universities

