The NCI's Human Tumor Atlas Network

NCI Team in Alphabetical Order: Chamelli Jhappan, *Erika Kim**, Erin Beck, Indu Kohaar, *Jacob Kagan**, Jerry Li, Justin Benavidez, Miguel Ossandon, Nick Hodges, *Richard Mazurchuk*,* Sean Hanlon, *Shannon Hughes*,* Sharmistha Ghosh-Janjigian, Sidney Fu, Sudhir Srivastava, *Tracy Lively** *(*Former Members)*

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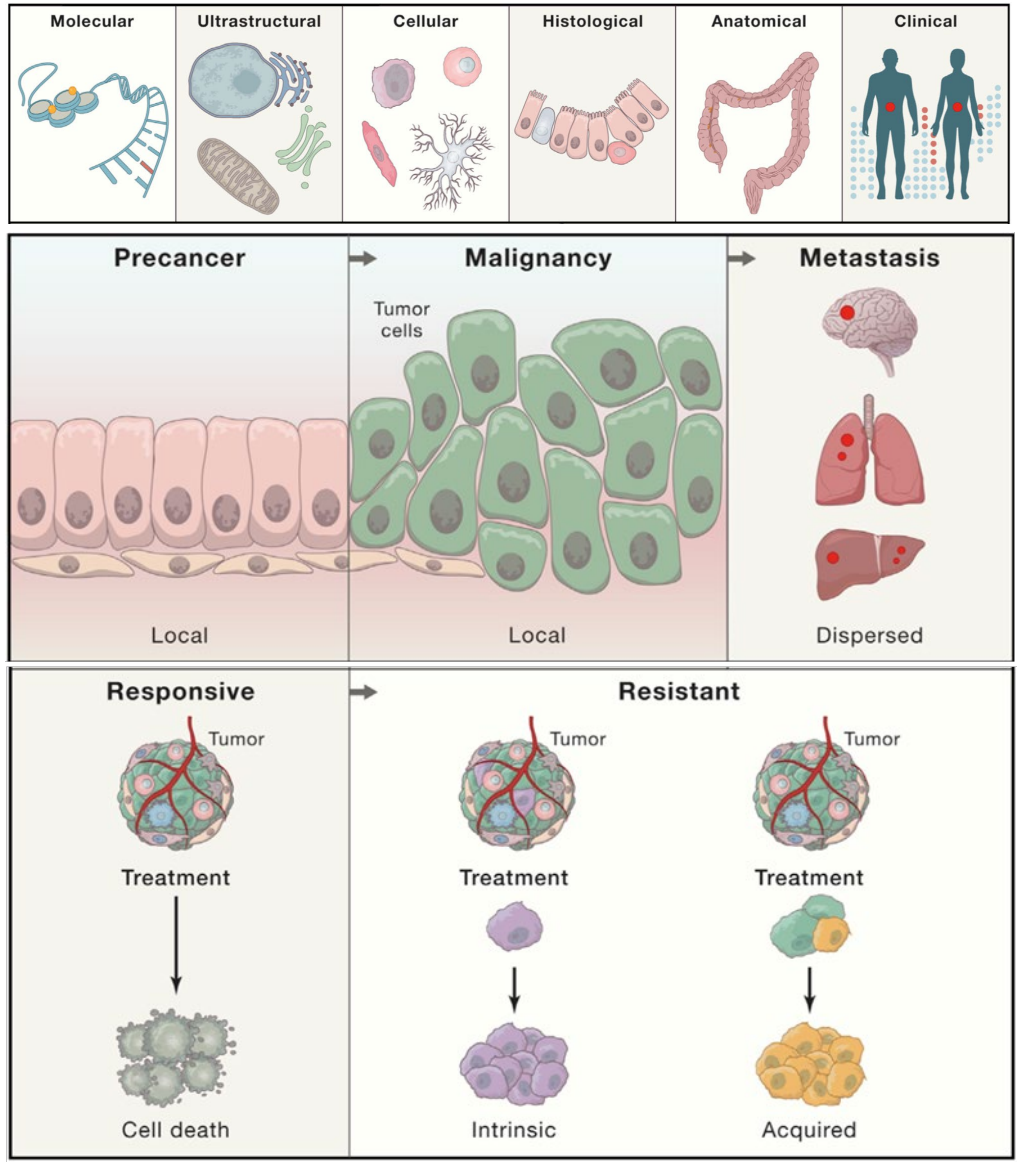
The NCI Human Tumor Atlas Network (HTAN)

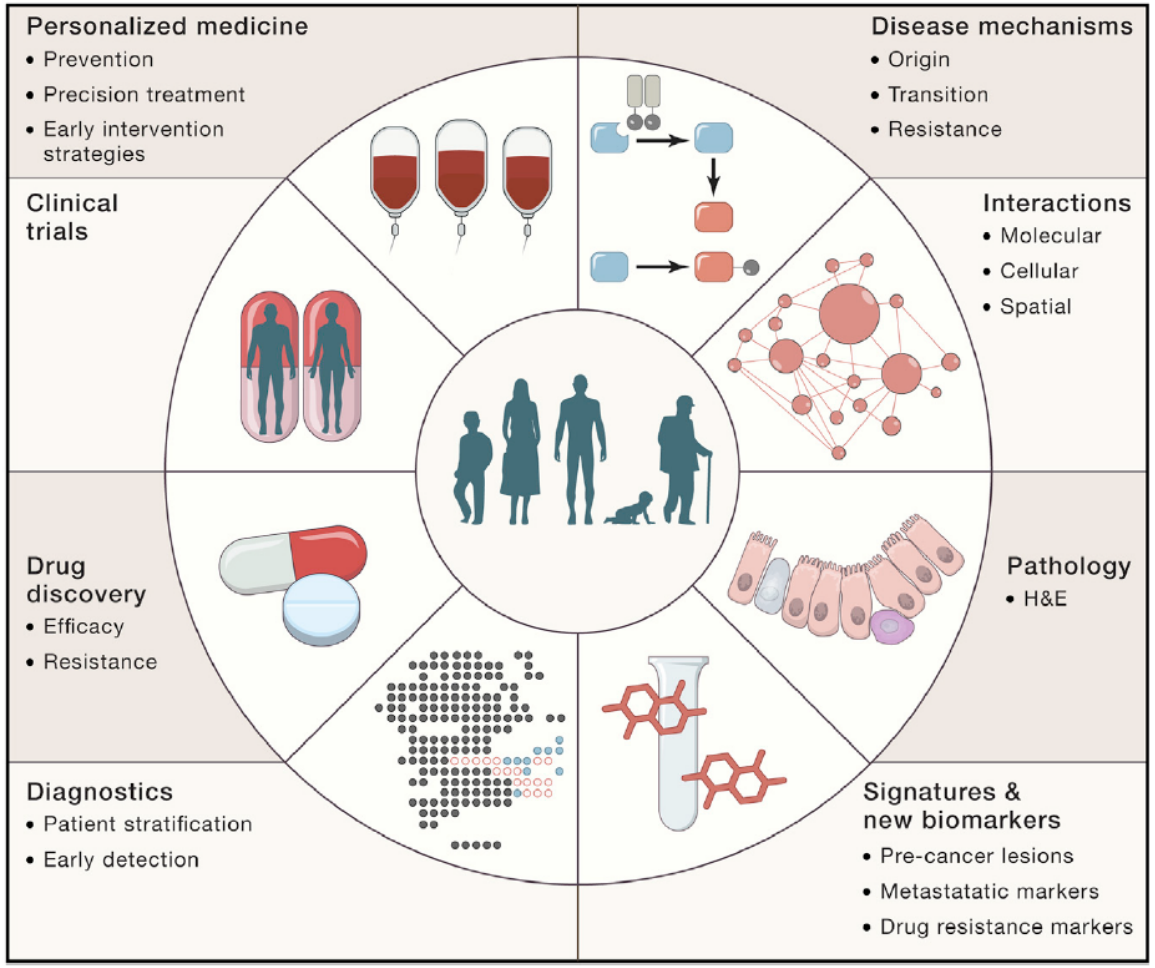
Overarching program goal: Construct dynamic 3D atlases of human cancers

- ***Integrate*** molecular, cellular, and tumor tissue composition and architecture, including the microenvironment and immune milieu
- Describe ***transitions during cancer:*** pre-malignant lesions to malignancy, locally invasive to metastatic cancer
- Represent a ***diverse patient population***
- Enable ***predictive modeling*** to refine detection and therapeutic choices for patients.



HTAN Marker Paper. Rozenblatt-Rosen et al., Cell 2020

Tumor Atlases Facilitating an Era of Precision Medicine

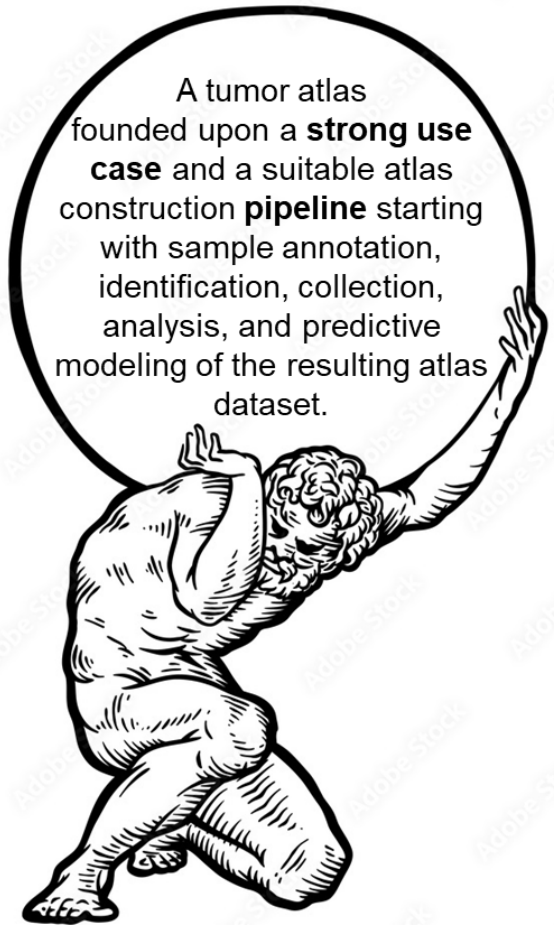


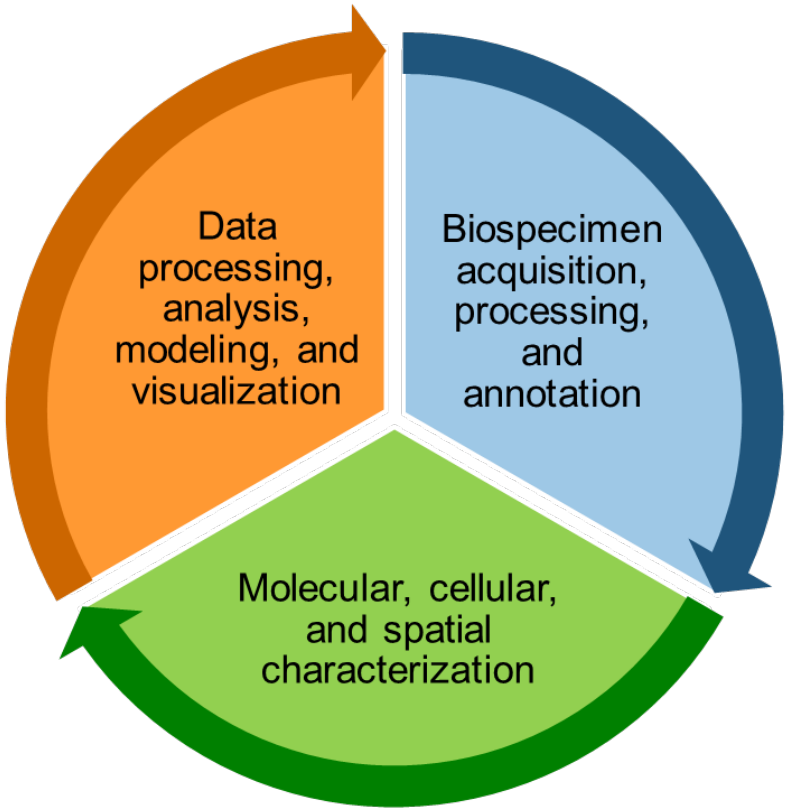
HTAN Marker Paper, Cell 2020:
https://doi.org/10.1016/j.cell.2020.03.053

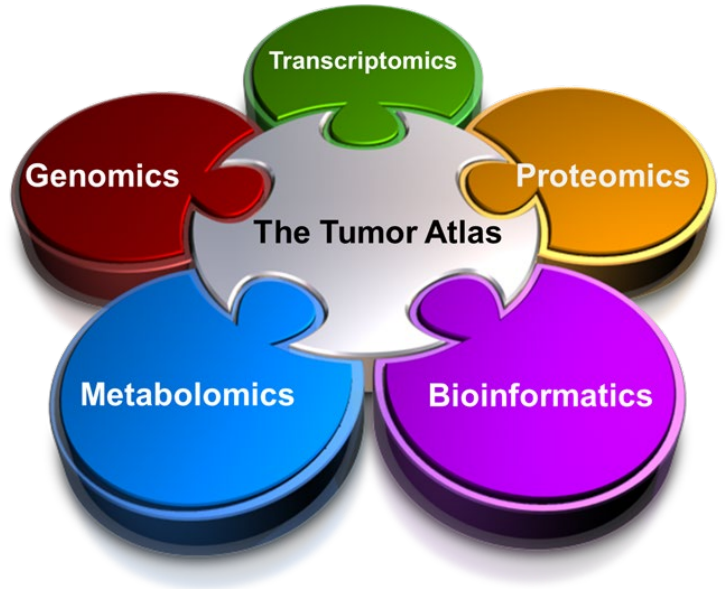
HTAN Principles

- **Community Resource** – create a community resource that catalyzes cancer research across disciplines
- **Complementary Approaches** – strengths and weaknesses will be discovered as a Network; expect to work together
- **Open Communication** – accelerate science by breaking down walls; strive towards interoperability
- **Data and Resource Sharing** – requirement for success; expect aggressive public data/resource release timelines

Building Multimodal and Spatial Atlases







HTAN Structure

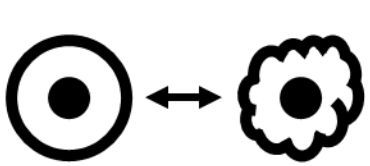
Normal → Pre-malignant → Malignant → Metastatic → Responsive → Resistant

5 Pre-Cancer Atlas Centers

5 Tumor Atlas Centers

HTAN-Data Coordinating Center

HTAN Steering Committee



Precancer Atlas Subcommittee

Advisory Committee for Data Coordination (ACDC)

Computational Alignment WG

Methods WG

Visualization WG

Translational WG

Outreach WG

Visit the HTAN Data Portal:
https://data.humantumoratlas.org/

HTAN Data Coordinating Center (DCC)


Alex


Dar'ya


Adam


Ethan


Milen


Rochelle


Ashley


Niki


Vésteinn


Bill


Dave


Ino

Four partner institutions

- Dana-Farber Cancer Institute
- Sage Bionetworks
- Institute for Systems Biology
- Memorial Sloan-Kettering Cancer Center

Aaron Lisman

Onur Sumer

Xiang Li

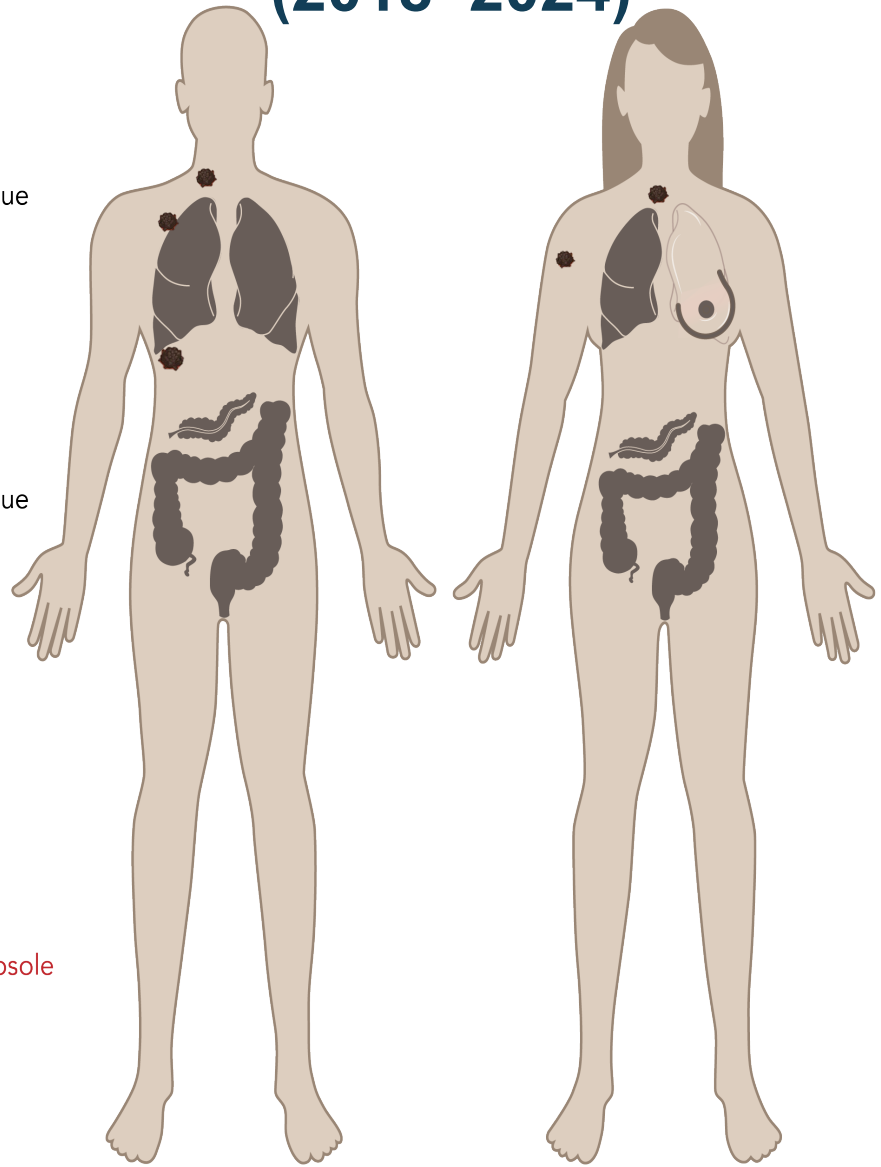
Subhi Nandakumar

Tiarah Thomas

Lisa Pasquale

Bill Clifford

HTAN Tumor Types: Phase 1
(2018–2024)



LUNG

Avrum Spira and Steven Dubinett
Boston Univerity and University of California Los Angeles

Dana Pe'er and Christine Icabuzio-Donahue
Memorial Sloan Kettering Cancer Center

Molecular and Cellular Characterization

PANCREAS

Dana Pe'er and Christine Icabuzio-Donahue
Memorial Sloan Kettering Cancer Center

MCL Consortium Pre-Cancr Atlas Pilot

and Samuel Achilefu
Washington University in St. Louis

COLON

Michael Snyder and James Ford
Stanford University

Robert Coffey, Ken Lau and Martha Shrubsole
Vanderilt University

Bruce Johnson and Aviv Regev
Dana-Farber Cancer tute

FNLCR and Broad Institute
Tumor Atlas Pilot

BREAST

Shelley Hwang, Carlo Maley and Robert West
Duke University, Arizona State University and Stanford University

Joe Gray, Gordon Mills, Jeremy Goecks and George Thomas
Oregon Health and Science University

Bruce Johnson and Aviv Regev
Dana-Farber Cancer I :ute

Li Ding, Ryan Fields, William Gillanders and Samuel Achilefu
Washington University in St. Louis

Frederick National Laboratory for Cancer Research (FNLCR)
and Broad Institute Tumor Atlas Pilot

MCL Consortium Pre-Cancr Atlas Pilot

SKIN

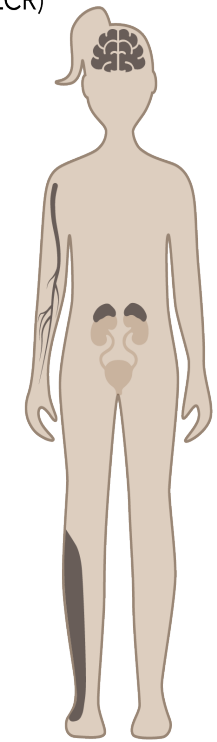
Peter Sorger, Sandro Santagata an Jon Aster
Harvard University and Brigham and Women's Hospital

Bruce Johnson and Aviv Regev
Dana-Farber Cancer Institute and Broad Institute

PEDIATRIC

FNLCR and Broad Institute
Tumor Atlas Pilot
glioma / neuroblastoma / sarcoma

Kai Tan and Stephen Hunger
Children's Hospital of Philadelphia
glioma / neuroblastoma /
very high risk acute lymphoblastic leukemia



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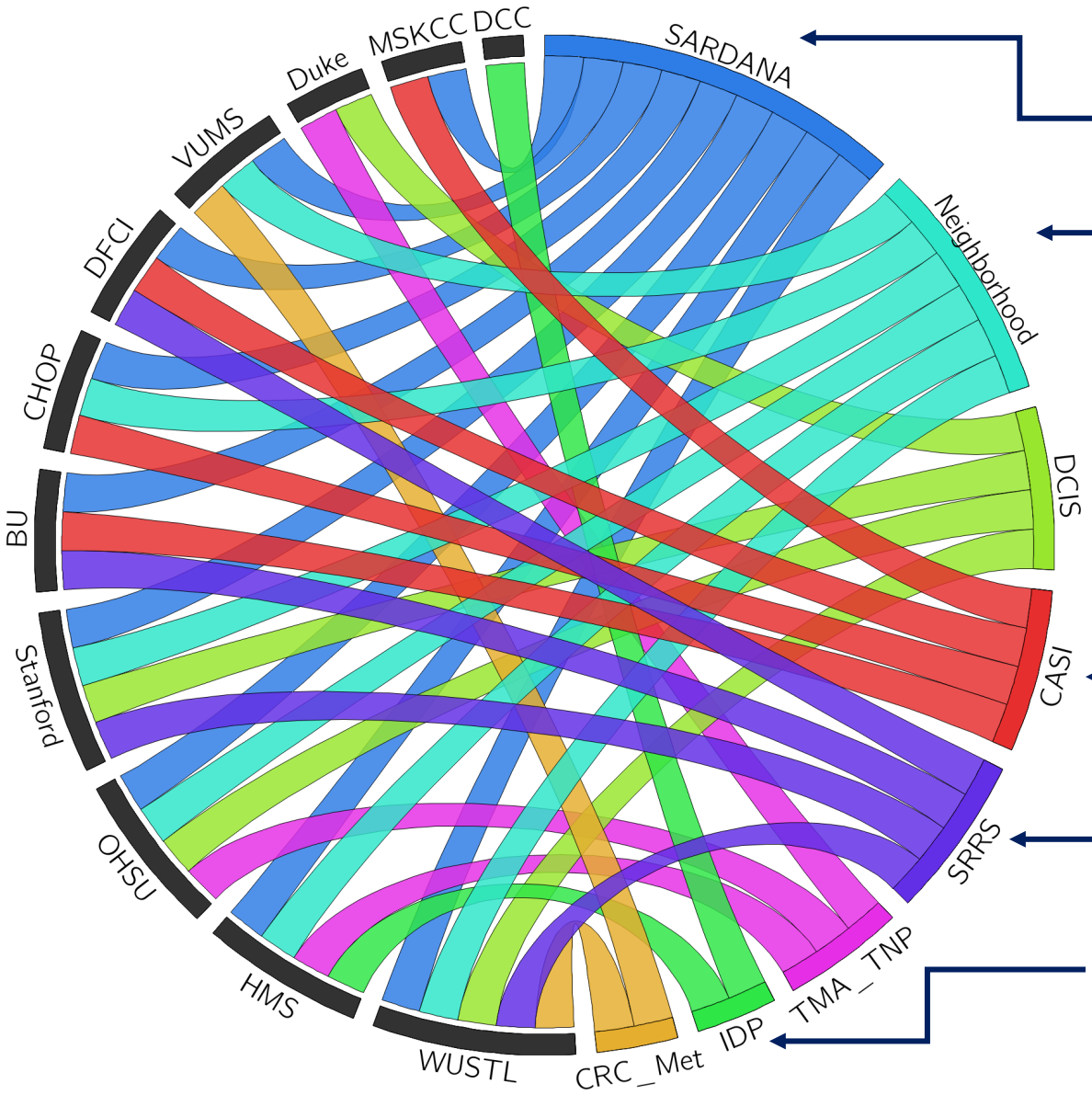
https://data.humantumoratlas.org/

Collaborative Efforts to Achieve Goals Collectively

Phase 1 Trans-Network Projects

Build an interactive consortium through collaborations

Address common technical & biological opportunities



Comparing imaging modalities across HTAN

What defines a "Cell Neighborhood"?

Optimizing assays for small lesions

Standards for immune cell identification

Adding information about social determinants of health

Creating resources for sharing highly multiplexed HTAN imaging data

Highlights from HTAN Phase 1

A publicly available set of spatially-resolved tumor maps describing transitions in cancer for use by the cancer research community

https://www.nature.com/collections/fihchcjehc

Common Themes Across Tumor Types and Analyses

- Recurring cellular spatial patterns that typify **co-evolution of tumor and stroma** emerging as drivers for progression and resistance
- **Discovery of rare, transitional, dedifferentiated and/or plastic tumor cell types** - often conserved across tumor subtypes and correlated with poor outcome
- Deep **exploration of stroma, immune and tumor cell interactions**
  - Regulation of tumor growth via **immune-suppressive signaling circuits** and cancer subtype-specific **spatially organized immune-malignant cell networks**
  - Cancer-associated fibroblasts (CAFs) act as **CAF-subtype-specific TME remodelers** that impact immune responses

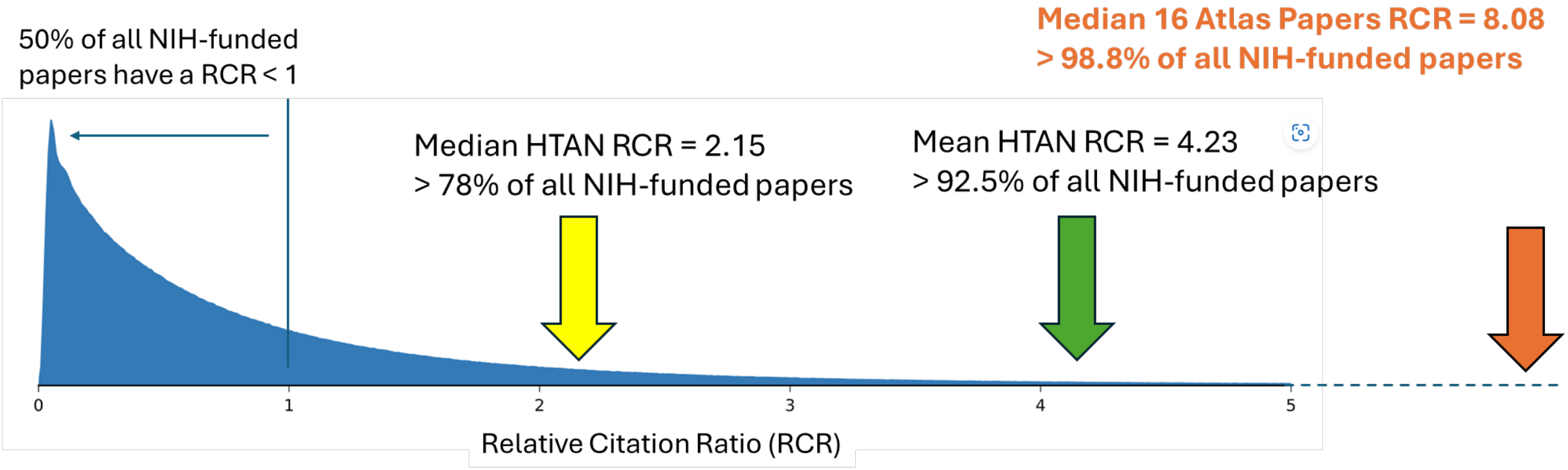
~200
Total HTAN publications and preprints

20+
Primary Atlases Publications

50+
New analytical or experimental tools

HTAN Impact

Primary research papers citing HTAN support – 235



This is the distribution of RCR values for approximately 31M papers indexed on PubMed.

HTAN Tumor Types: Phase 2
(Launched in Fall 2024)

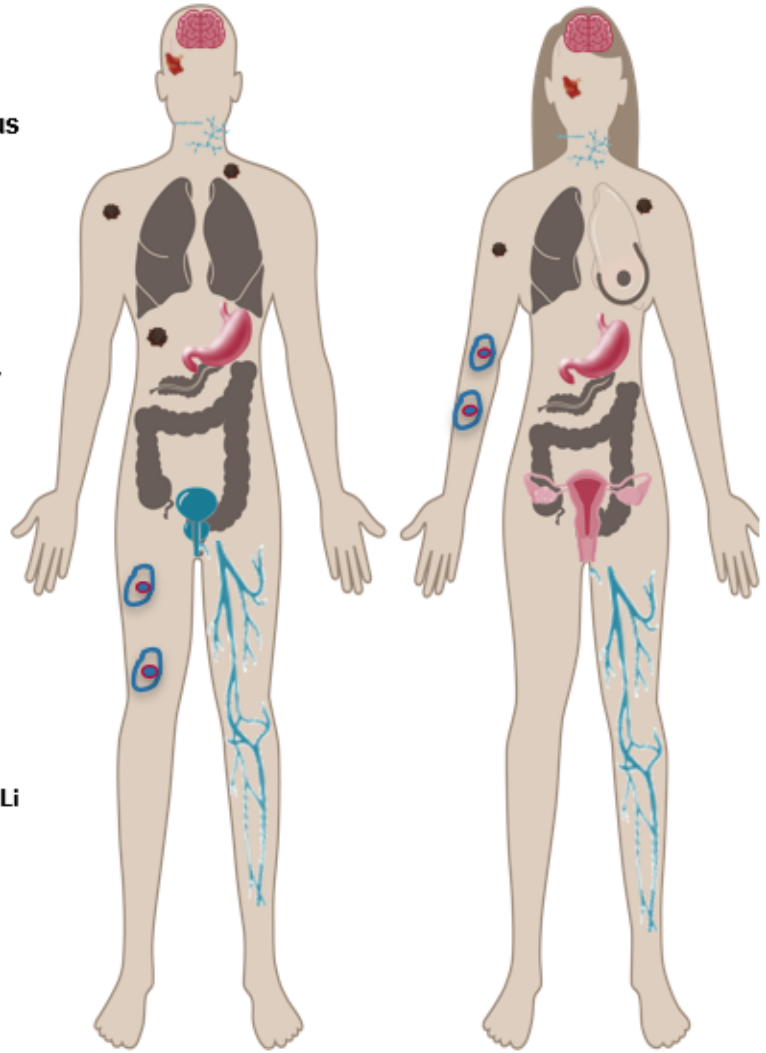
SKIN
Melanoma and Cutaneous Squamous Cell Carcinoma
Alan Shain, Boris Bastian and Iwei Yeh
University of California, San Francisco

PANCREAS
Rosalie Sears, Elana Fertig, Jonathan Brody and Laura Wood
Oregon Health & Science University

BRAIN
Long Cai, Richard Everson, Matthew Thomson and Barbara Wold
California Institute of Technology

GASTRIC
Linghua Wang, Tae Hyun Hwang, Mingyao Li and Paul Mansfield
MD Anderson

MULTIPLE MYELOMA
Irene Ghobrial
Dana Farber Cancer Institute



PROSTATE
Li Ding, Feng Chen, Eric Kim and Russell Pachynski
Washington University in St. Louis

COLON
Ken Lau and Jeffery Spraggins
Vanderbilt University

OVARY
Samuel Mok, Michael Birrer and Sammy Ferri-Borgogno
MD Anderson

LYMPHOMA
Rong Fan, Stephanie Halene, Zongming Ma and Mina Xu
Yale University

PEDIATRIC SOLID TUMORS
Rhabdomyosarcoma, Neuroblastoma and Wilms Tumor
Shahab Asgharzadeh, James Amatruda and Long Cai
University of California, Los Angeles

https://data.humantumoratlas.org/

HTAN Phase 2: building on the goals of HTAN Phase 1

A publicly available set of spatially-resolved tumor maps describing transitions in cancer for use by the cancer research community

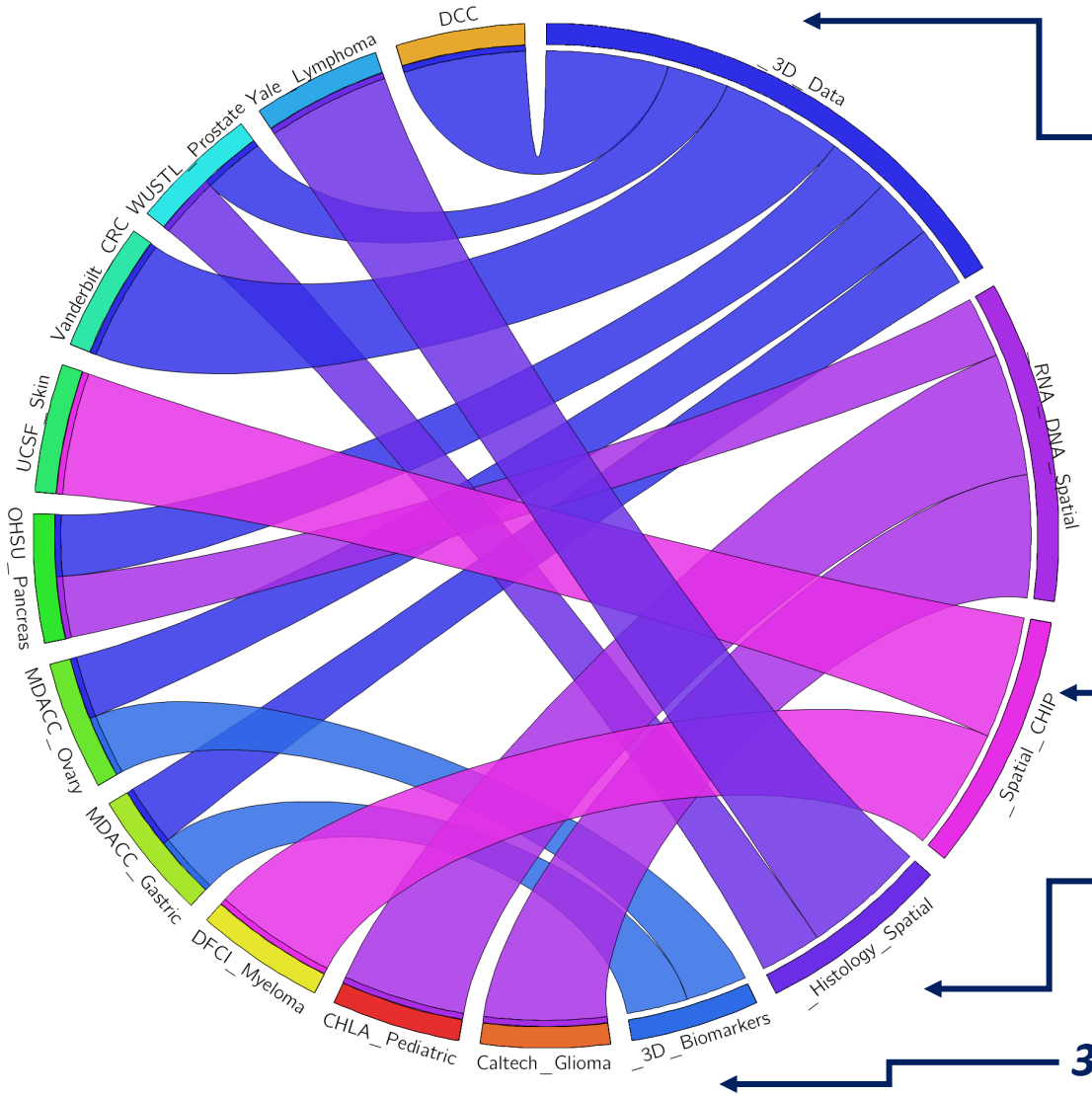
https://www.nature.com/collections/fihchcjehc

Collaborative Efforts to Achieve Goals Collectively

Phase 2 Trans-Network Projects

Build an interactive consortium through collaborations

Address common technical & biological opportunities



Management, interoperability, & useability of 3D data

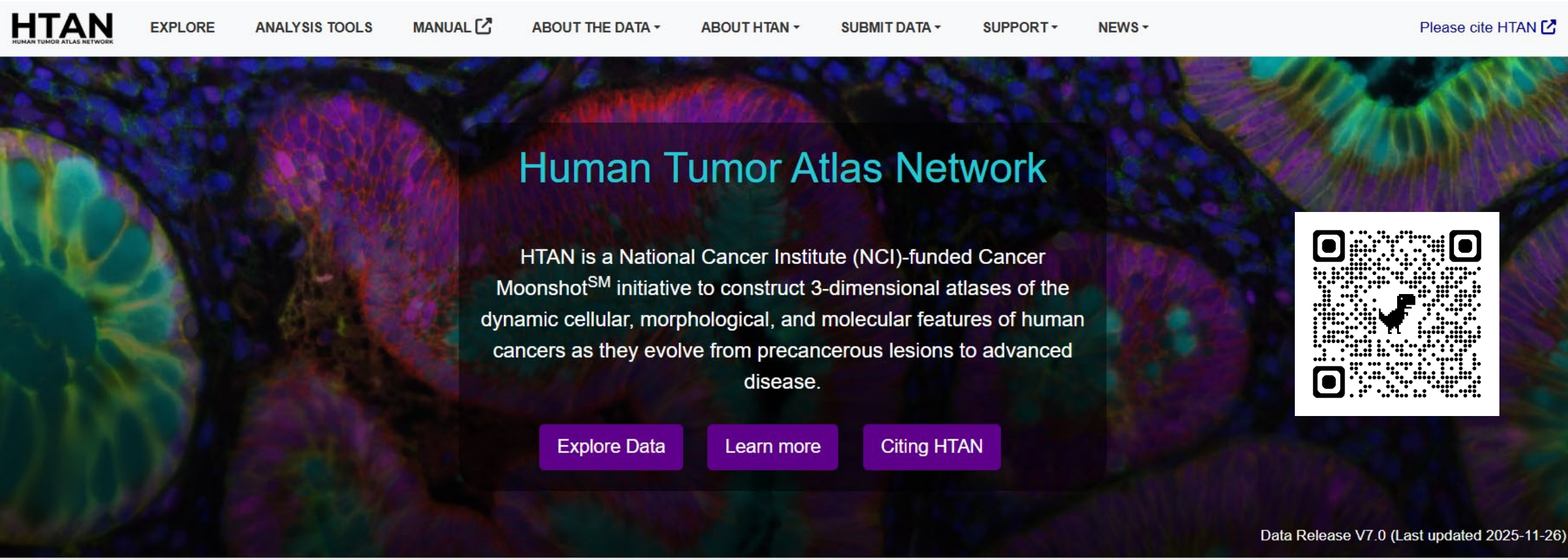
Combined DNA & RNA spatial omics

Spatial profiling CHIP across tumor types

Linking histology and spatial-omics with AI

3D Biomarkers from FFPE blocks

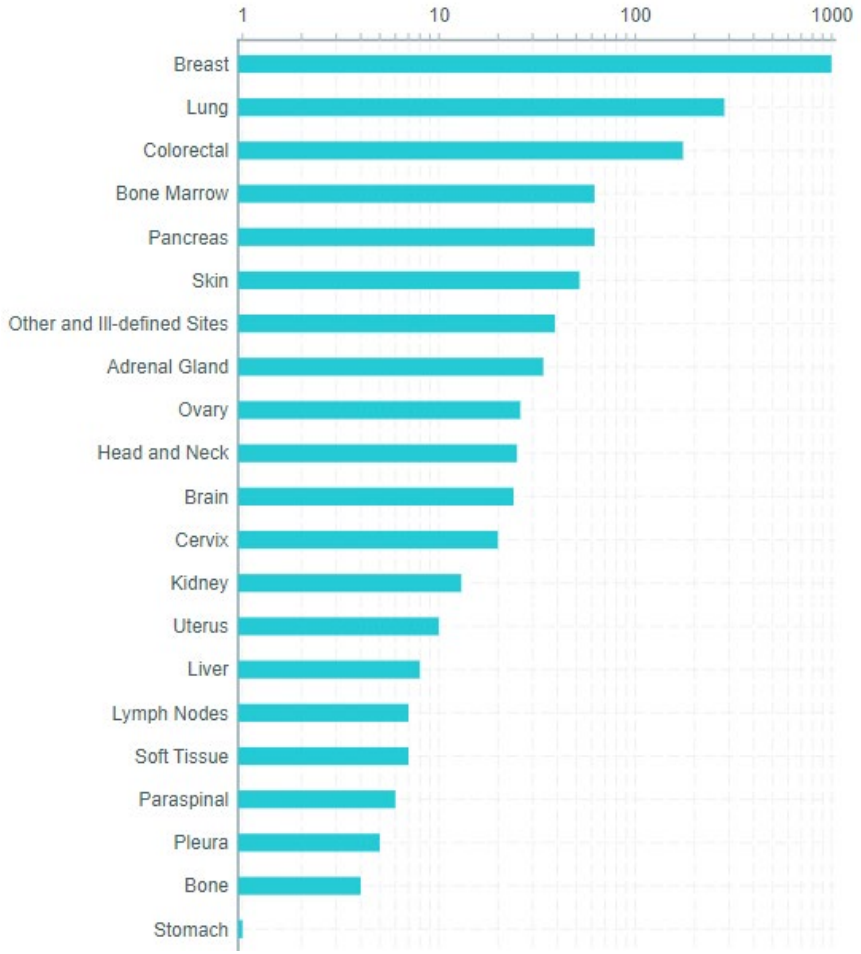
HTAN Data and Resources



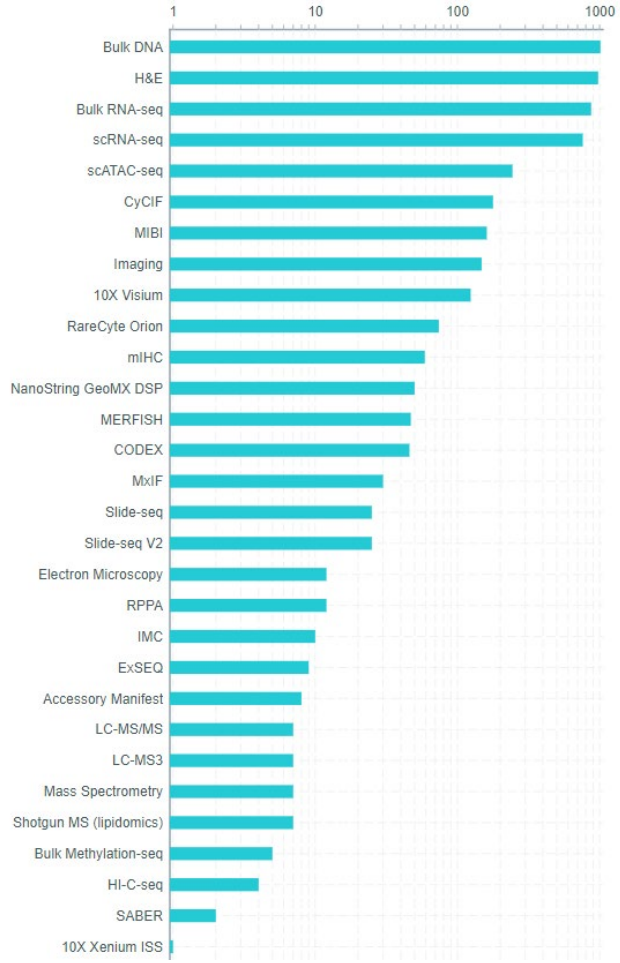
14	20	2372	10585
Atlases	Organs	Cases	Biospecimen

HTAN Generates Data From a Large Number of Assays and Across Many Tumor Types

Data Available from 20 Primary Tumor Sites

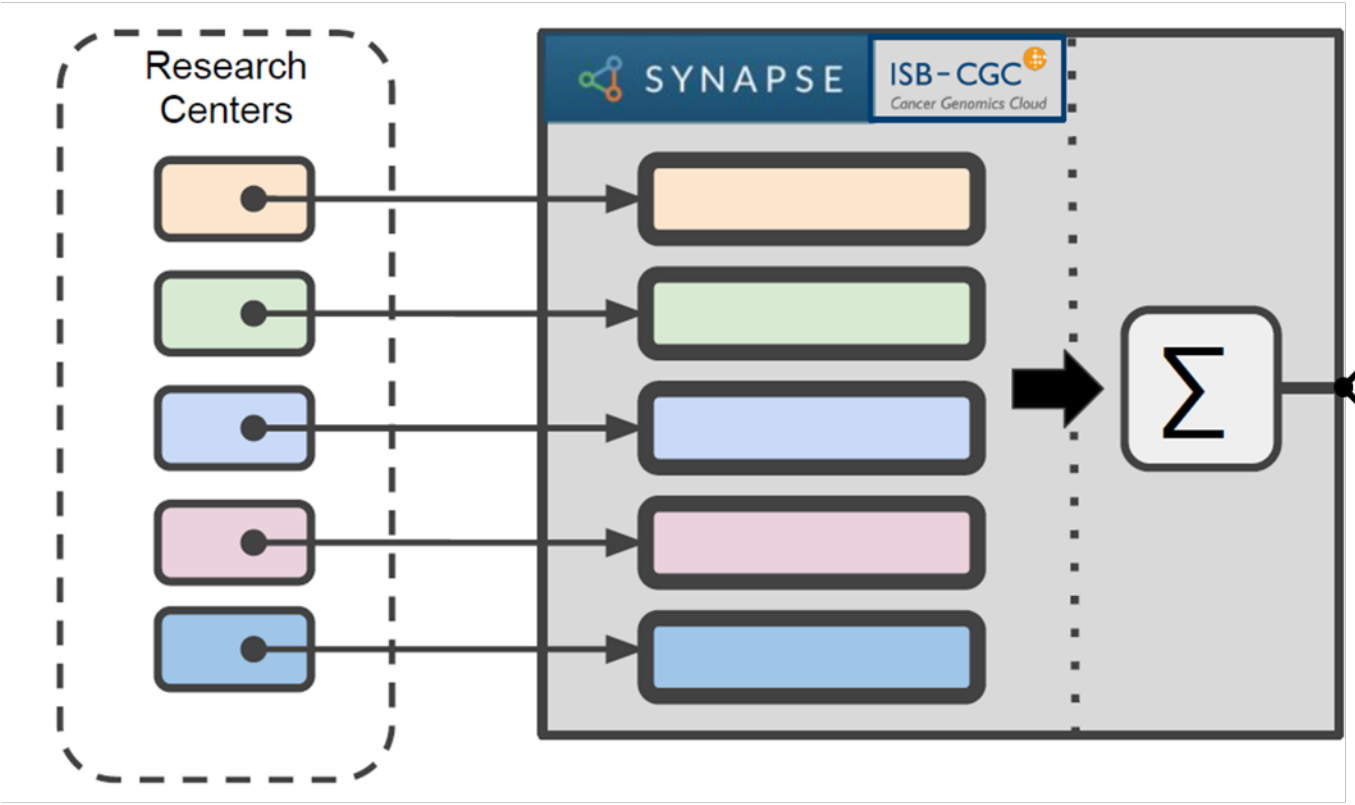


Data Available from 30 Different Assays



https://data.humantumoratlas.org/

Making HTAN Data Available and Accessible



HTAN Data Portal

Processed data available for visualization and download

HTAN
HUMAN TUMOR ATLAS NETWORK

CRDC

Raw data available for analysis in the cloud

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Cancer Data Service

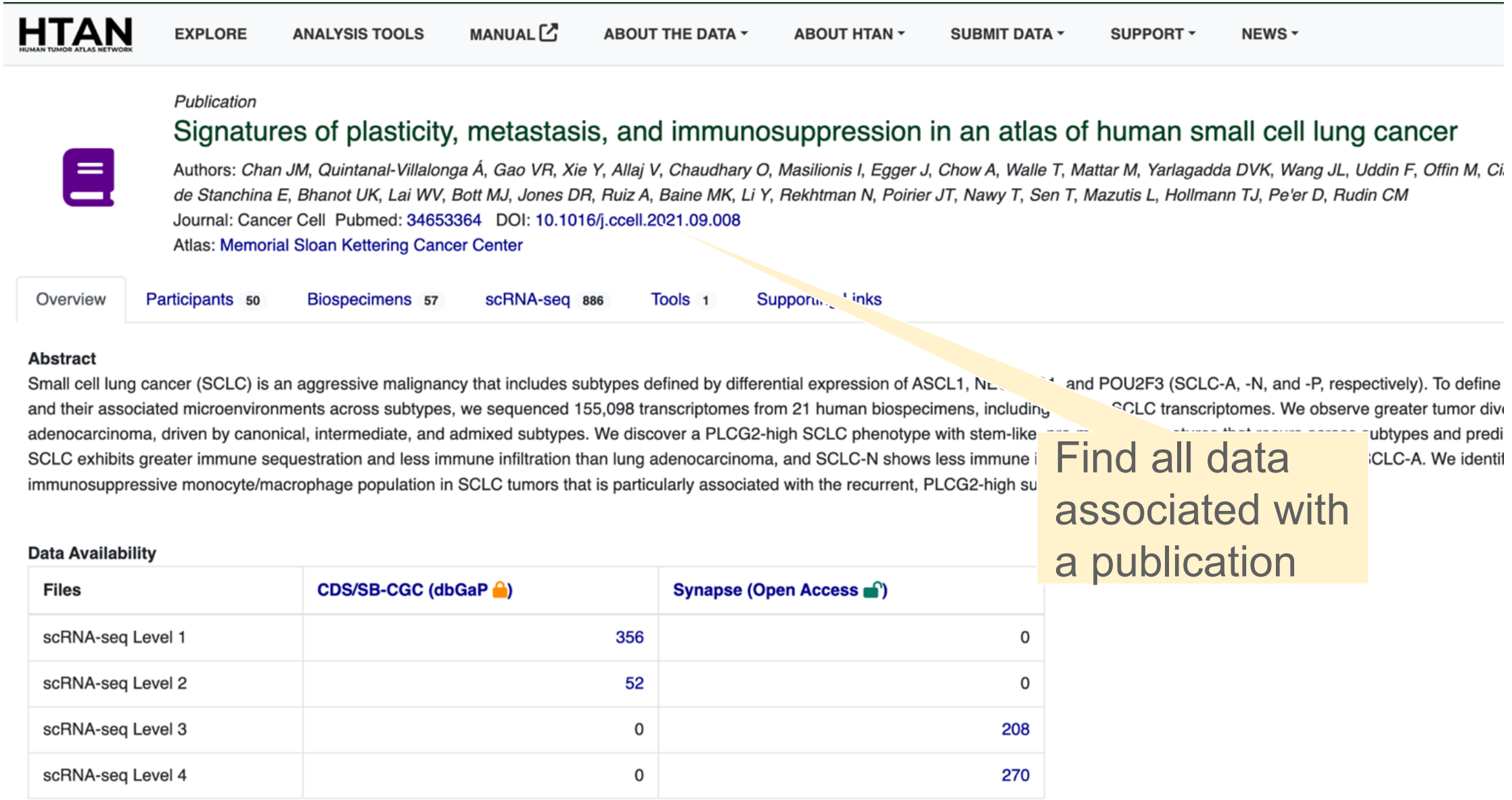
CANCER GENOMICS CLOUD
SEVEN BRIDGES

CELLxGENE

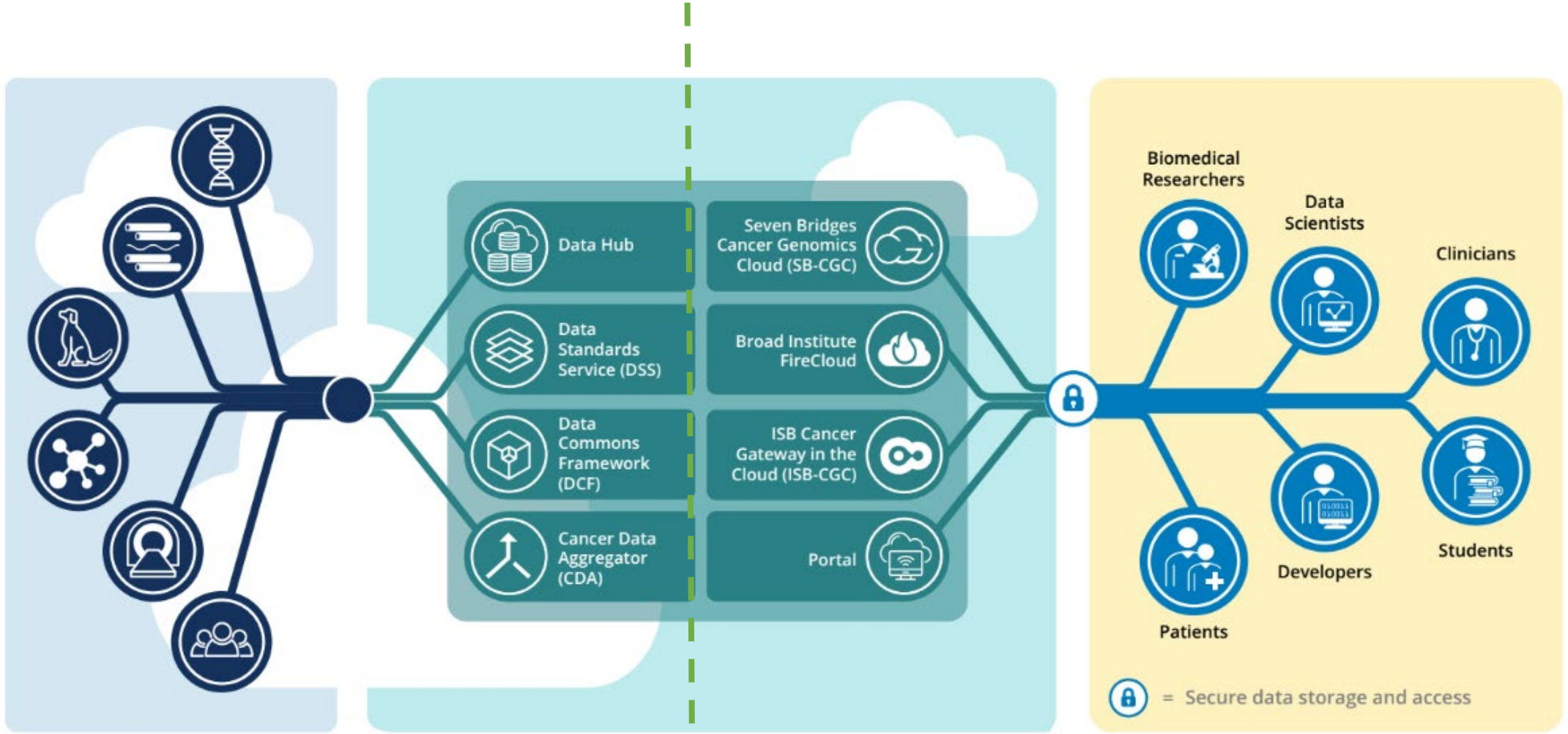
AutoMinerva

Google BigQuery

Finding HTAN Data



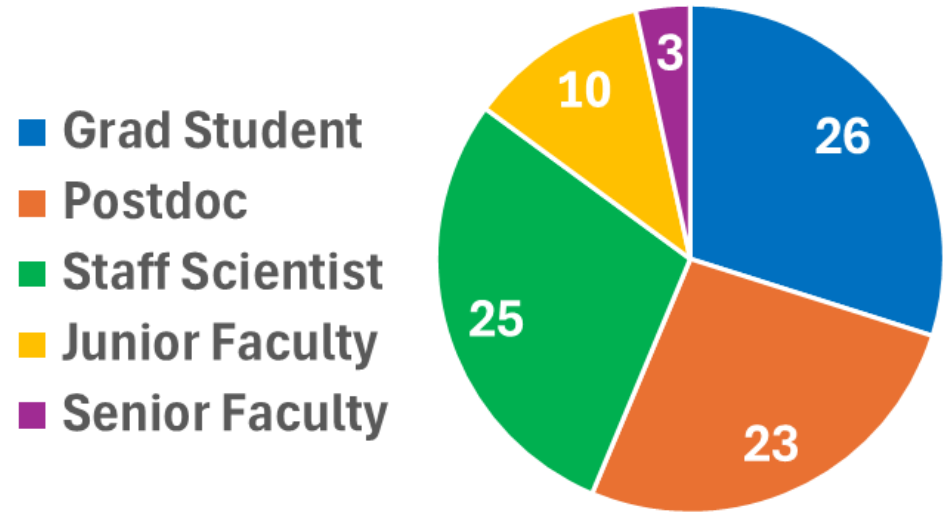
NCI Cancer Research Data Commons (CRDC)



HTAN Data Jamborees

- **Virtual HTAN Jamboree, Dec 2023 & In-Person HTAN Jamboree, Nov 2024**
  - ~200 total participant applications
  - ~30 total project pitch submissions

- ~90 participants selected to work on **12 projects, each addressing a specific scientific question or technical challenge using available HTAN data**
  - ✓ Promote the **access and reuse** of HTAN data
  - ✓ Promote **collaborations** to expand the HTAN community
  - ✓ Promote development of **new methods and tools** for HTAN data analysis
  - ✓ Identify **gaps and limitations** of existing HTAN data and resources



NIH NATIONAL CANCER INSTITUTE

OVERVIEW | AGENDA | REGISTRATION | PROJECT SUBMISSIONS | RESOURCES | PRE-WORK | VENUE | HOTEL

Overview

The National Cancer Institute (NCI) invites you to participate in a data event, titled "NCI Data Jamboree: Enhancing Data Sharing and Utility to Advance Cancer Research," to collaborate in a small collaborative group setting and solve specific problems using a variety of cancer research datasets. The goals include:

- Overcoming barriers to finding, accessing, and using cancer data resources to improve diagnosis and treatment options.
- Promoting interdisciplinary collaborations to expand the size, technical, and scientific diversity of the cancer research community.
- Promoting the development and application of tools, methods, and pipelines for data harmonization, visualization, integration, and analysis.
- Evaluating data quality for replication and reproducibility, or AI-readiness of the data.
- Identifying gaps and limitations of existing data and computing resources.

Dates: November 16 - 18, 2026

Venue: NIH Neuroscience Center Building, 6001 Executive Blvd., Rockville, Maryland 20852.

Format: In-person teams preferred; virtual and hybrid teams allowed.

HTAN is Part of a Larger Atlasing Community

- **Annual HTAN Junior Investigators Meeting with Multiple Consortia**
- NIH-HCA Meeting, March 2020
- Functional Proteomics Workshop, Aug 2020
- NIH Atlas Meeting, December 2020
- Cross-consortium Metad WG
- Atlas to Practice Idea Lal September 2024
- **NIH Spatial Biology Me (June 17–18, 2026)**

HTAN
HUMAN TUMOR ATLAS NETWORK

wellcome

THE HUMAN PROTEIN ATLAS

LungMAP

MRC Medical Research Council

KPMP

Chan Zuckerberg Initiative

THE KLARMAN FAMILY FOUNDATION

HUMAN CELL ATLAS

DMAP

THE LEONA M. AND HARRY B. HELMSLEY CHARITABLE TRUST

BRAIN RESEARCH THROUGH ADVANCING INNOVATIVE NEUROTECHNOLOGIES
BRAIN INITIATIVE

HuBMAP
The Human BioMolecular Atlas Program

Immunological Genome Project

European Commission

Summary

Built for Scale and Collaboration

- NCI-funded network of Tumor Atlas and Pre-Cancer Atlas centers
- Multidisciplinary teams: clinical, experimental, computational
- Unified standards via a Data Coordinating Center

Addressing Areas Difficult for Individual Studies

- Multi-dimensional atlases from precancer through metastasis
- Tumor heterogeneity and microenvironment at single-cell resolution
- Biomarkers for detection, prognosis, and treatment response
- Generating new biological insights and hypotheses

Open Data the Community Can Use Today

- HTAN Data Portal: multi-omics, spatial, and imaging datasets
- FAIR-compliant, interoperable, integrated with NCI CRDC
- Tools for visualization, exploration, and download

www.cancer.gov

www.cancer.gov/espanol