

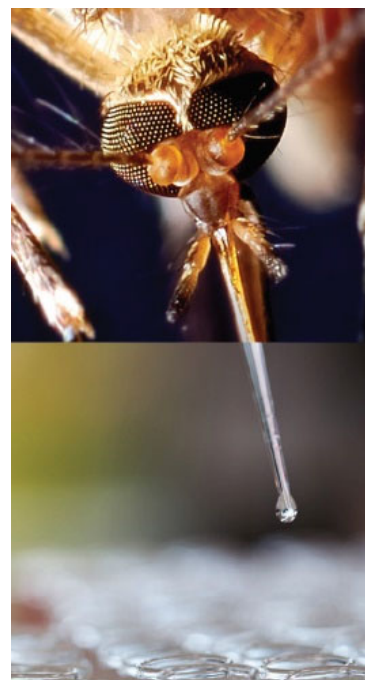
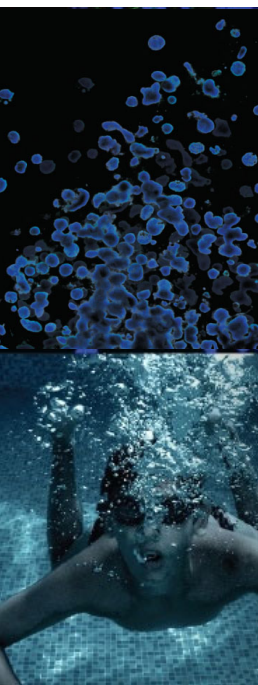


Organoid Culture Fundamentals: Critical Steps for Success

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Credible Leads to Incredible™

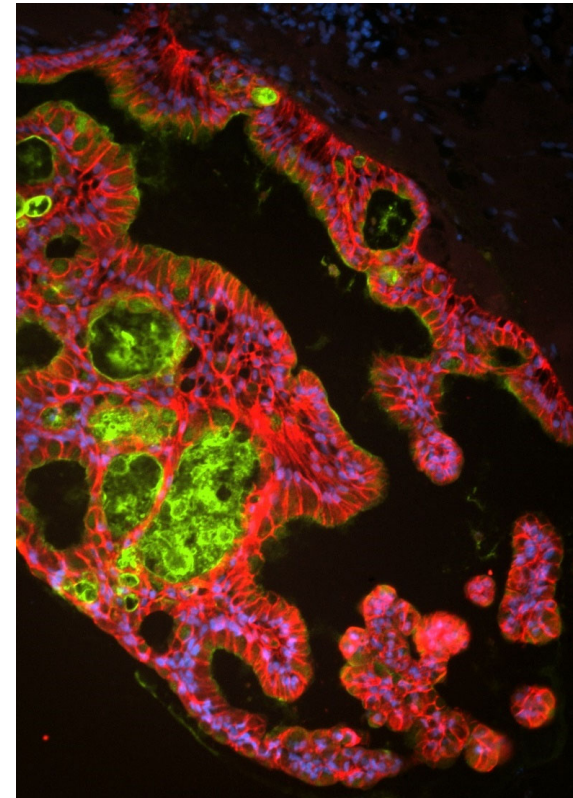


About ATCC

- Founded in 1925, ATCC is a non-profit organization with HQ in Manassas, VA, and an R&D and Services center in Gaithersburg, MD
- World's largest, most diverse biological materials and information resource for cell culture – the “*gold standard*”
- Innovative R&D company featuring gene editing, differentiated stem cells, advanced models
- cGMP biorepository
- Partner with government, industry, and academia
- Leading global supplier of authenticated cell lines, viral and microbial standards
- Sales and distribution in 150 countries, 19 international distributors
- Talented team of 450+ employees, over one-third with advanced degrees

Agenda

- HCMI Background
- Model Descriptions
- HCMI Support / GDC and HCMI Catalog
- ATCC Cell Culture Support
- Organoid Culture Educational Video



Why are new models needed?

- Poor representation of some cancer types/subtypes
- Lack of patient and clinical outcome data, model history
- Lack of comparison to normal reference sample and/or directly compared to primary tumor
- Insufficient to capture the genetic diversity of cancer
- Existing lines may not be biologically/genetically representative of in vivo tumor

There is a need for better preclinical models to predict therapeutic outcomes



Overview of HCMI and ATCC

Founders

- National Cancer Institute
- Cancer Research UK
- Hubrect Organoid Technology Foundation
- Wellcome Sanger Institute

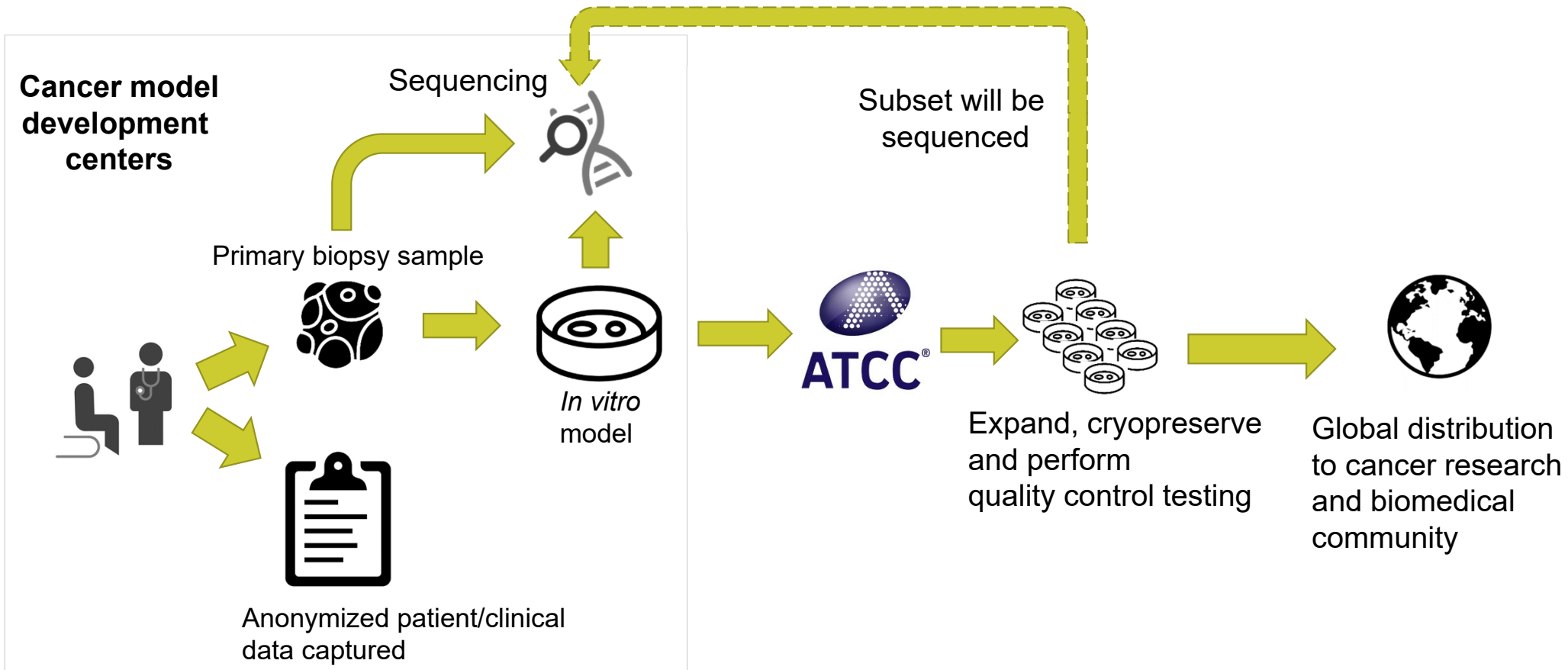
Model Development

- Broad Institute
- Cold Spring Harbor Laboratory
- Wellcome Sanger Institute
- Hubert Organoid Technology Foundation
- University of Verona
- Hubrecht Institute
- Stanford University
- Weill Cornell Medical College

Distribution



Generation and distribution of HCMI models



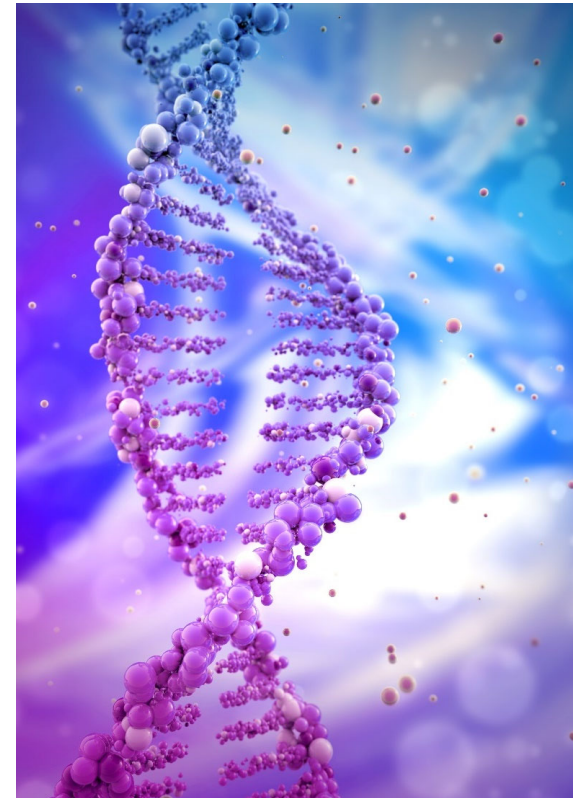
Characterization of models

Molecular

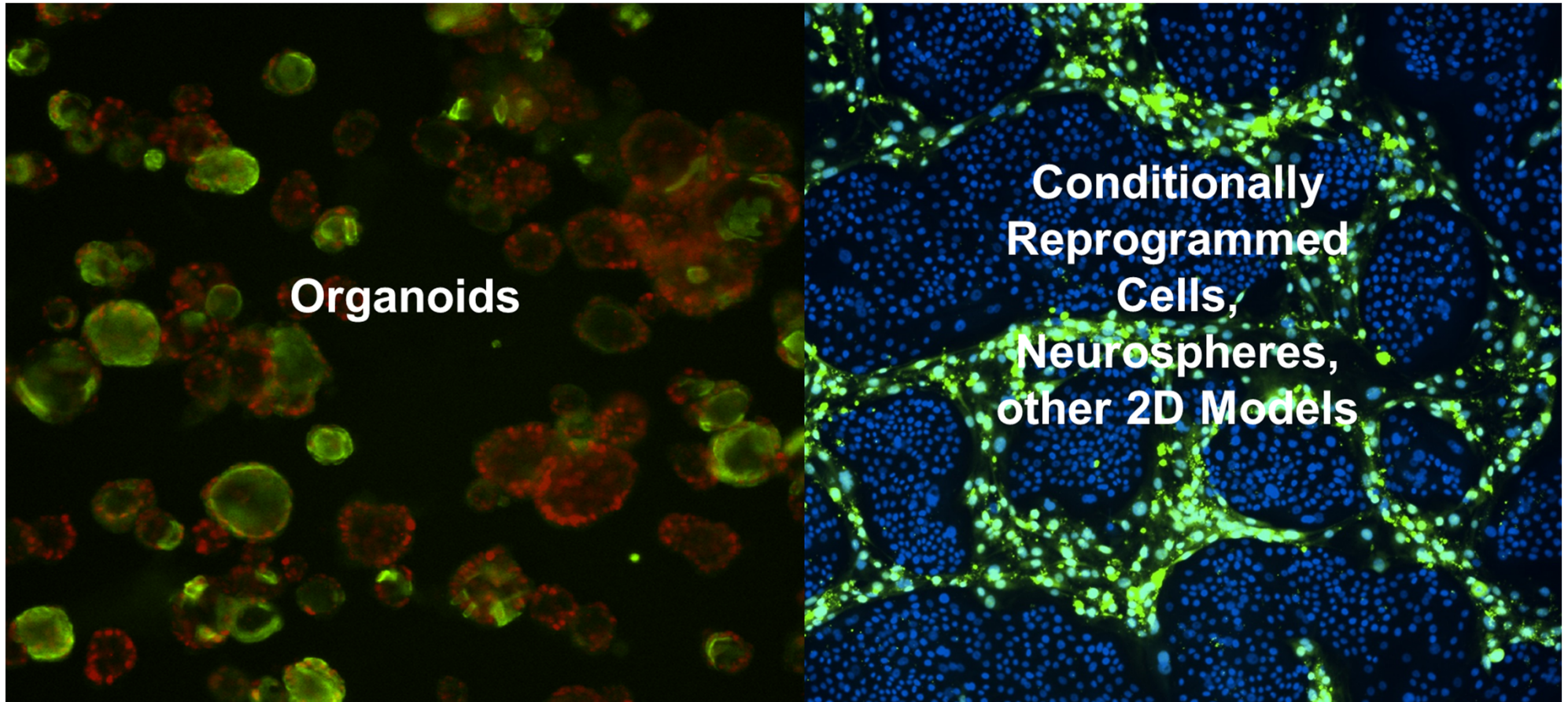
- 15X Whole Genomic Sequencing (WGS) of model, primary tumor, and normal tissue
- 150X Whole Exome Sequencing (WXS) of model, primary tumor, and normal tissue
- RNA-seq of model and primary tumor

Clinical

- Disease diagnosis
- Patient demographics
- Treatment and outcomes



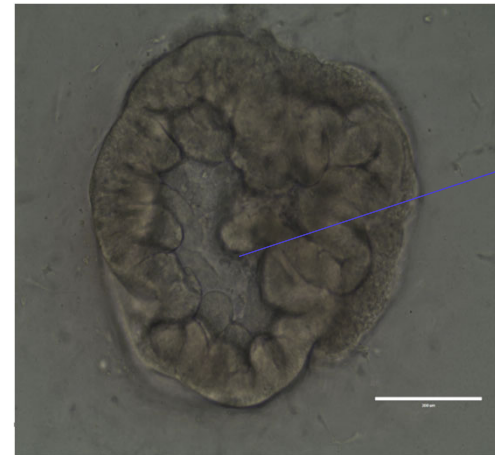
Advanced culture technologies



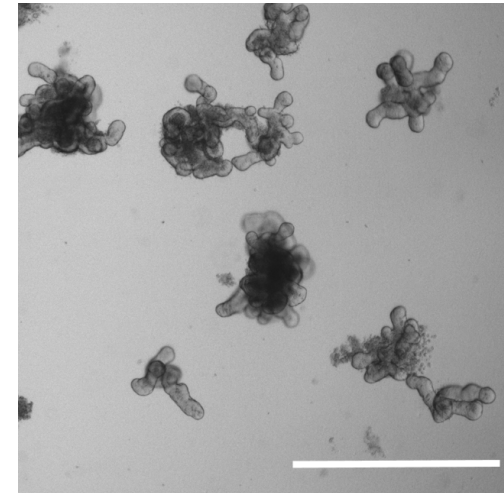
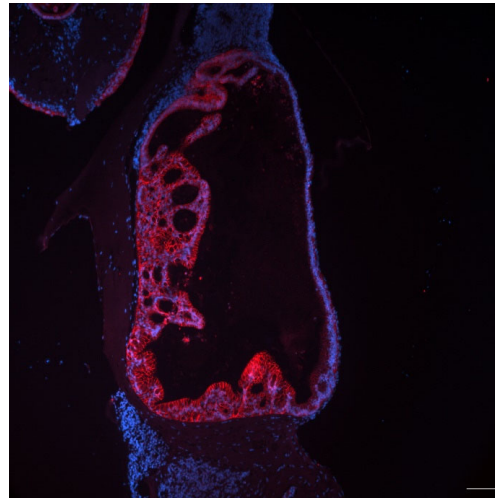
What is an HCMI Organoid?

Organoids are complex, self organizing microtissues embedded within a 3D extracellular matrix

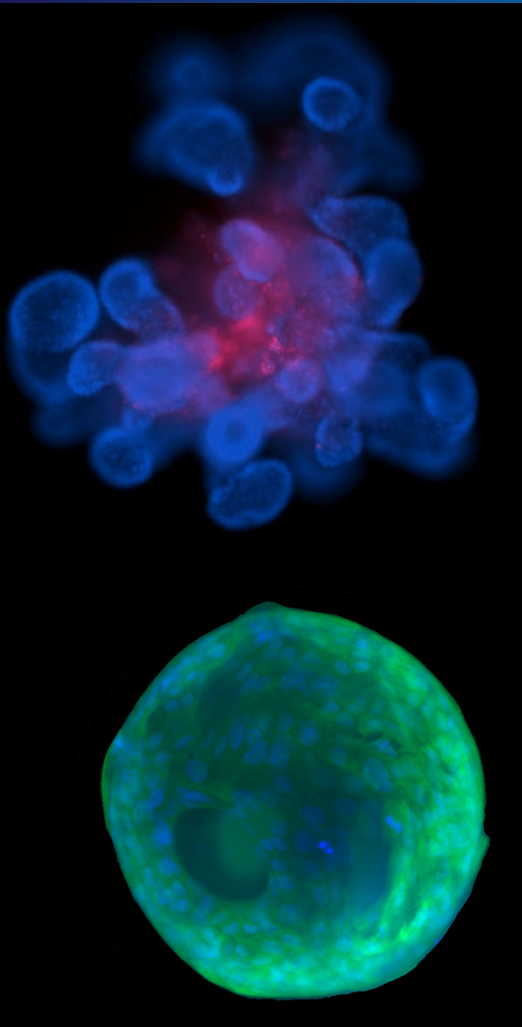
- Patient derived
- Multiple cell types
- Cellular polarization
- In vivo like architectural features (lumen)
- Long term expansion
- Phenotypically and genetically stable



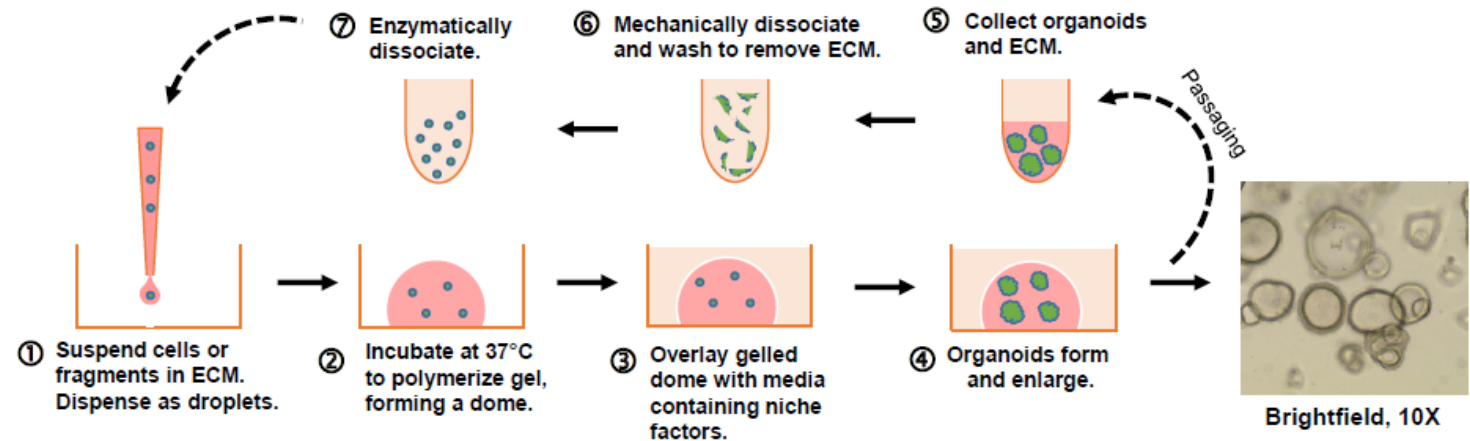
Lumen



Organoid technology



Embedded three-dimensional culture technique that utilizes model-specific growth media formulations in combination with undefined extracellular matrix



<https://currentprotocols.onlinelibrary.wiley.com/doi/epdf/10.1002/cpcb.66>

Model resources and data access

Human Cancer Models Initiative

Search By Model Name
 Search By Gene
 Search By Research Somatic Variant

Primary Site
 Research Somatic Variant Type
 Consequence
 Type

Use the filter panel on the left to customize your model search.

Models By Primary Site: 18 Total

Has Multiple Models

2D Versus 3D Growth

Showing 1 - 20 of 148 models

Name	Primary Site	Clinical Tumor Diagnosis	Tissue Status	Age At Acquisition (Years)	Age At Diagnosis (Years)	Has Multiple Models	Expansion Status
HCM-BROD-0355-C49	Unknown	Rhabdomyosarcoma	Primary	0	0	No	EXPANDED
HCM-BROD-0051-C64	Kidney	Wilms tumor	Metastasis	4	2	No	EXPANDED
HCM-BROD-0679-C43	Skin	Melanoma	Metastasis	4	2	No	EXPANDED
HCM-BROD-0005-C41	Bone	Ewing's sarcoma	Metastasis	8	7	No	EXPANDED
HCM-BROD-0035-C49	Bone	Rare cancers	Metastasis	11	9	No	EXPANDED
HCM-BROD-0103-C71	Brain	Glioblastoma	Primary	11	11	No	EXPANDED
HCM-BROD-0007-C49	Bronchus and lung	Rhabdomyosarcoma	Metastasis	13	12	No	EXPANDED
HCM-BROD-0254-C49	Connective tissue	Rhabdomyosarcoma	Metastasis	13	11	Yes (2)	EXPANDED
HCM-BROD-0254-C49-B	Connective tissue	Rhabdomyosarcoma	Metastasis	13	11	Yes (2)	EXPANDED
HCM-BROD-0121-C41	Bone	Ewing's sarcoma	Metastasis	15	14	No	EXPANDED
HCM-BROD-0038-C41	Bone	Osteosarcoma	Primary	16	16	No	EXPANDED
HCM-BROD-0053-C49	Connective tissue	Rare cancers	Metastasis	16	16	No	EXPANDED
HCM-BROD-0036-C41	Bone	Ewing's sarcoma	Metastasis	26	13	No	EXPANDED
HCM-BROD-0052-C49	Connective tissue	Rare cancers	Primary	26	25	No	EXPANDED
HCM-BROD-0226-C43	Skin	Melanoma	Metastasis	37	31	No	EXPANDED
HCM-BROD-0227-C43	Skin	Melanoma	Metastasis	40	40	No	EXPANDED
HCM-BROD-0115-C16	Stomach	Stomach cancer	Metastasis	43	43	No	EXPANDED
HCM-BROD-0209-C71	Brain	Glioblastoma	Recurrent	43	41	No	EXPANDED
HCM-BROD-0214-C71	Brain	Glioblastoma	Recurrent	45	43	No	EXPANDED

- NCI managed website
- Integrates clinical, model, and genomic information
- Search for models of interest using various filters
 - Primary tumor site/acquisition site
 - Model type
 - Tumor diagnosis/stage/grade/histological type
 - Gender/age/ethnicity
- Links out to clinical and genomic data, ATCC model product page

hcmi-searchable-catalog.nci.nih.gov



Model resources and data access

NIH NATIONAL CANCER INSTITUTE GDC Data Portal

Home Projects Exploration Analysis Repository

Harmonized Cancer Datasets
Genomic Data Commons Data Portal

Get Started by Exploring:

Projects Exploration Analysis Repository

Q e.g. BRAF, Breast, TCGA-BLCA, TCGA-A5-A0G2

Data Portal Summary [Data Release 17.0 - June 05, 2019](#)

PROJECTS 47	PRIMARY SITES 68	CASES 33,605
FILES 376,791	GENES 22,872	MUTATIONS 3,142,246

GDC Applications

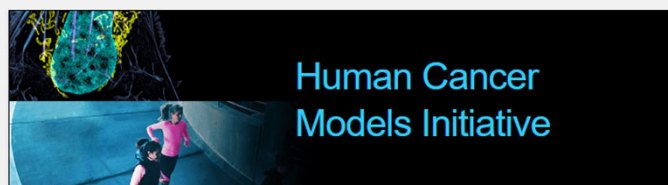
The GDC Data Portal is a robust data-driven platform that allows cancer researchers and bioinformaticians to search and download cancer data for analysis. The GDC applications include:

Data Portal Website Data Transfer Tool API Data Submission Portal Documentation Legacy Archive

- NCI managed website
- Search and download cancer related datasets for analysis
- Navigate to the “HCMI-CMDC” project for HCMI specific datasets
- Download WGS/WXS/RNAseq data
 - Aligned reads, gene expression, SNVs

portal.gdc.cancer.gov

Model resources and data access

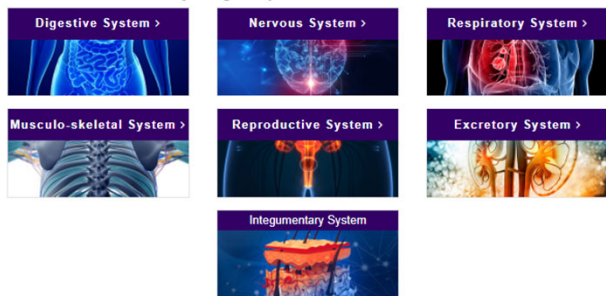


Human Cancer Models Initiative

Next-generation Cancer Models

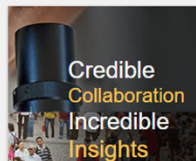
As part of our pledge to elevate biological models, ATCC is collaborating with the Human Cancer Models Initiative (HCM) to offer scientists a wide variety of next-generation 2D and 3D patient-derived *in vitro* cancer models, including organoids. ATCC is committed to making available a growing collection of models generated by the HCM, which will include both common as well as rare and understudied examples of cancer from numerous tissues. These HCM models are valuable tools to study cancer, identify and target novel therapies, and facilitate translational cancer research.

Cancer Models Based on Physiological System:



HCM RESOURCES

Posters
Brochures
Culture Guides
Application Notes
Webinars
Protocols



- View all models available or grouped by tissue
- Model specific information such as:
 - Culture images
 - Seeding densities
 - Media change frequencies
- Individual model product pages include detailed culture protocols
 - Complete media formulation
 - Thawing/subculturing/freezing guides
- Model pages link to other resource pages that host clinical and sequencing data
- Frequently asked questions

www.atcc.org/HCM

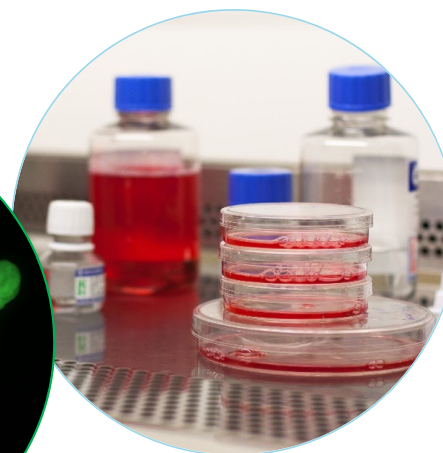
Detailed Support for Organoid Culture

Protocols

- Subculturing
- Thawing
- Freezing



Healthy
organoid growth



Formulations

- Complete list of components
- Medium – Reagents

CoreKits

- Reagents specific to models
- Recombinant proteins / chemicals



Coming Soon!

Where we are now

Over the past two years, ATCC has worked with NCI and the model developers to launch 150 next generation models including **80 organoid models**

Types

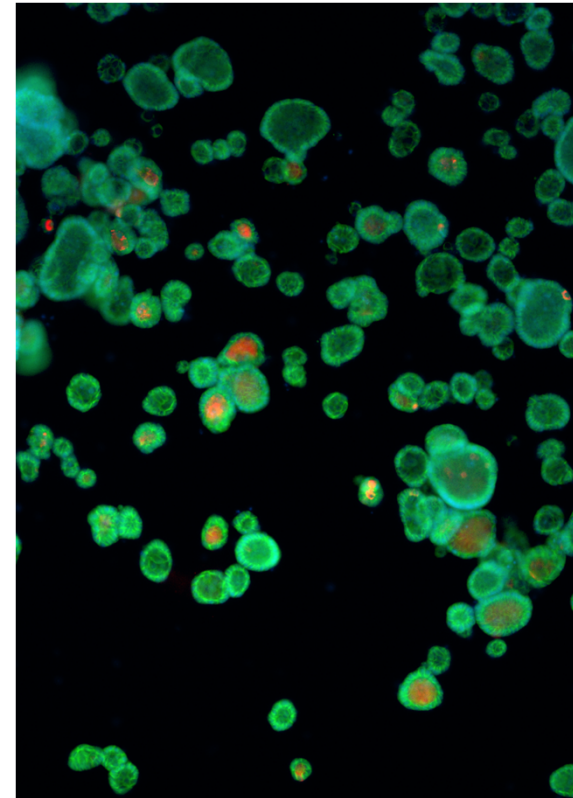
- Adenocarcinoma
- Carcinoma

Stages

- Primary
- Recurrent
- Metastatic
- Pre-malignant

Tissues

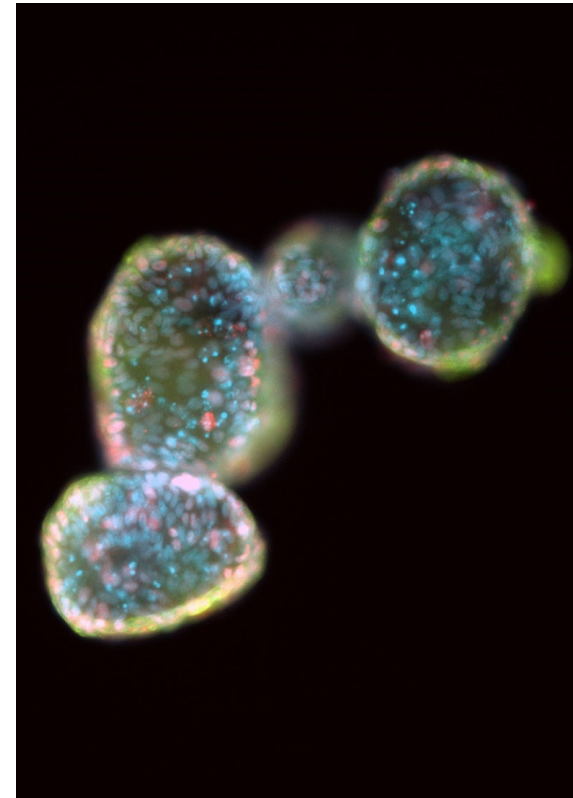
- Lung
- Colon
- Rectum
- Mammary
- Esophagus
- Pancreas
- Liver
- Stomach



Summary

- Information on models is available:
 - HCMI searchable catalog
 - GDC Data Portal
 - ATCC offers organoid culture protocols, formulations, and materials needed
 - Coming soon: Core growth kits to with pre-aliquoted supplements to make organoid culture easy
- ATCC currently offers 150 models with approximately 40 more models being launched in upcoming months
- For more information, download the Organoid Culture guide or re-watch the organoid cell culture video available on the ATCC website

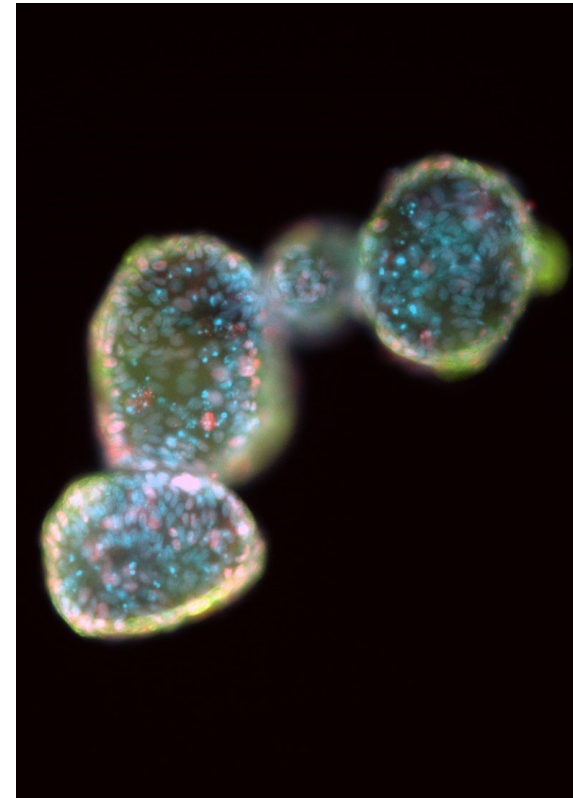
www.atcc.org/organoids



Upcoming events

- Webinars:
 - The Importance of Using Next-Generation Sequencing to Further Authenticate the ATCC Microbial Collections
 - Presented by: Briana Benton
 - April 8
 - ATCC offers organoid culture protocols, formulations, and materials needed
 - Coming soon: Core growth kits to with pre-aliquoted supplements to make organoid culture easy
- Tradeshow: AACR2021

www.atcc.org/organoids



AACR 2021

AACR Annual Meeting 2021

American Association for Cancer Research

4/10/2021 – 4/15/2021



Primary NK Cells and Luciferase Expressing Reporter Cell Lines for Use in Developing ADCC Assays for Immuno-oncology Drug Screening

Presenter: Haiyun Liu, PhD, *Scientist*, ATCC

Poster Number: 1306



Checkpoint Molecule Profiling in Tumor Cell Lines and Immune Cell Lines for Applications in Immuno-oncology Drug Screening

Presenter: Brian Della Fera, *Biologist*, ATCC

Poster Number: 1648

www.atcc.org/AACR2021

