

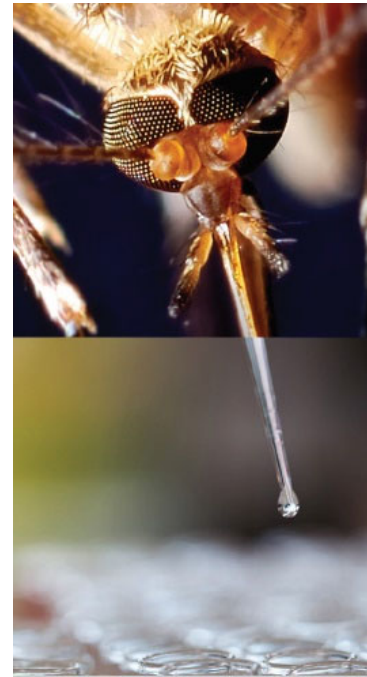
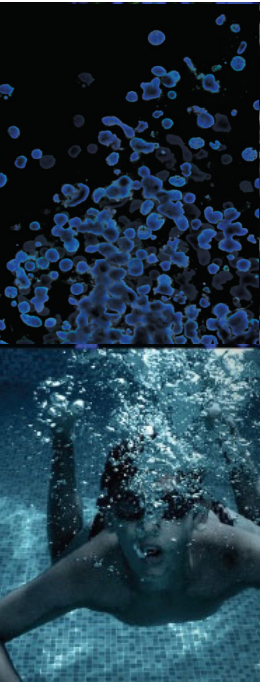


Organoid Growth Media: Techniques to Help You Streamline Culture

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Credible Leads to Incredible™

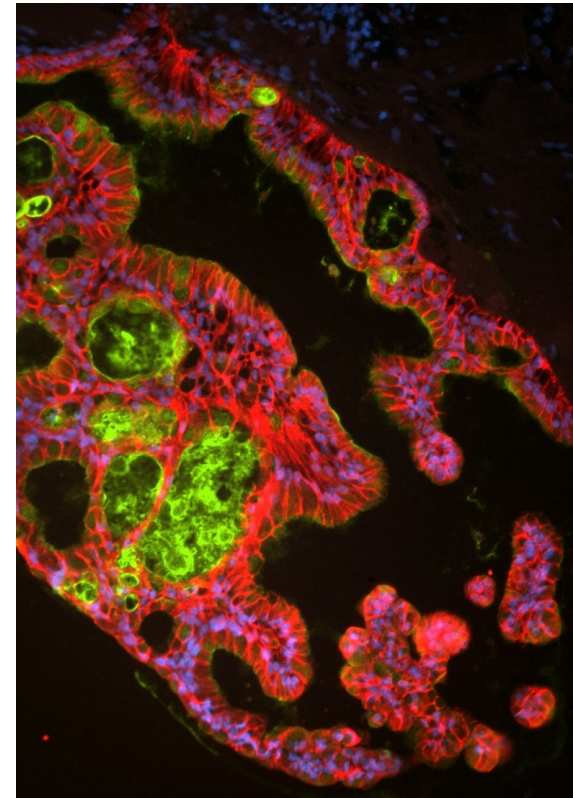


About ATCC

- 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 Medium Educational Video



Why are new models needed?

- Poor representation of some cancer types/subtypes
- Lack of patient and clinical outcome data, model history
- 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
- Hubrecht Organoid Technology Foundation
- Wellcome Sanger Institute

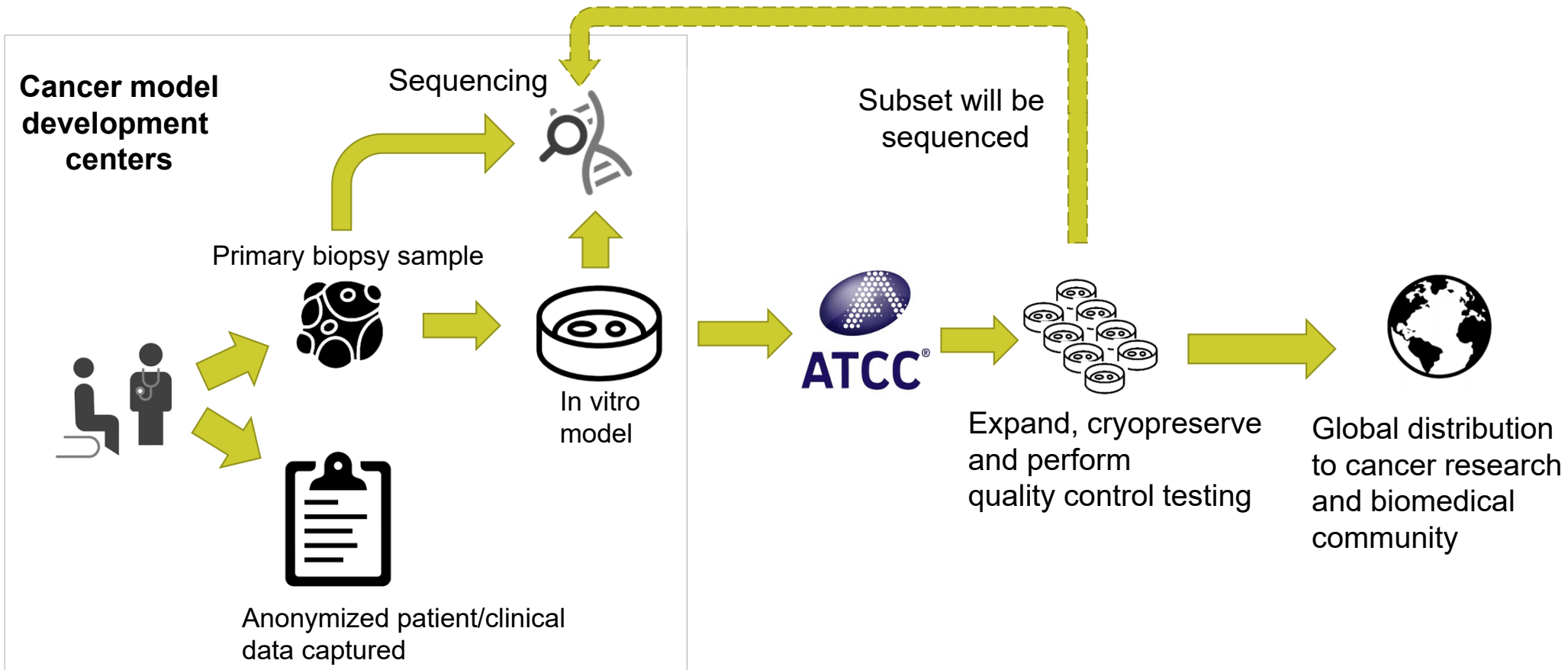
Model Development

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

Distribution



Generation and distribution of HCMI models



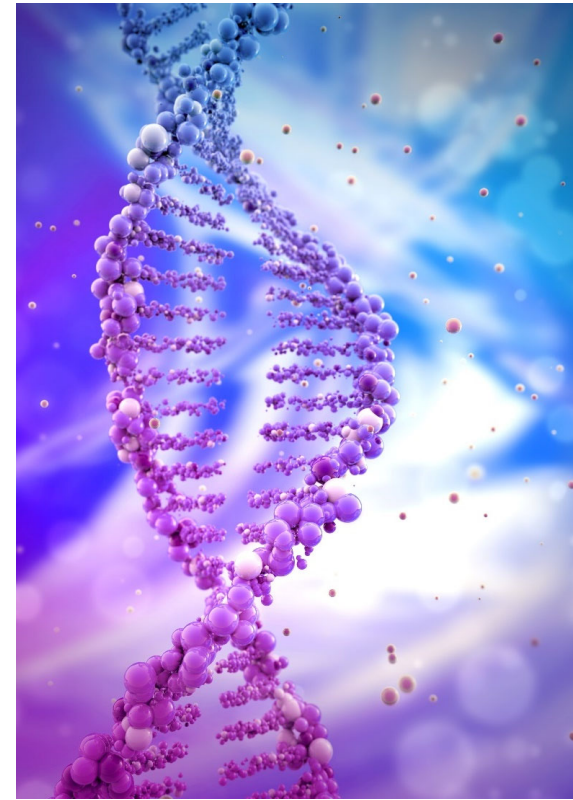
Characterization of models

Molecular

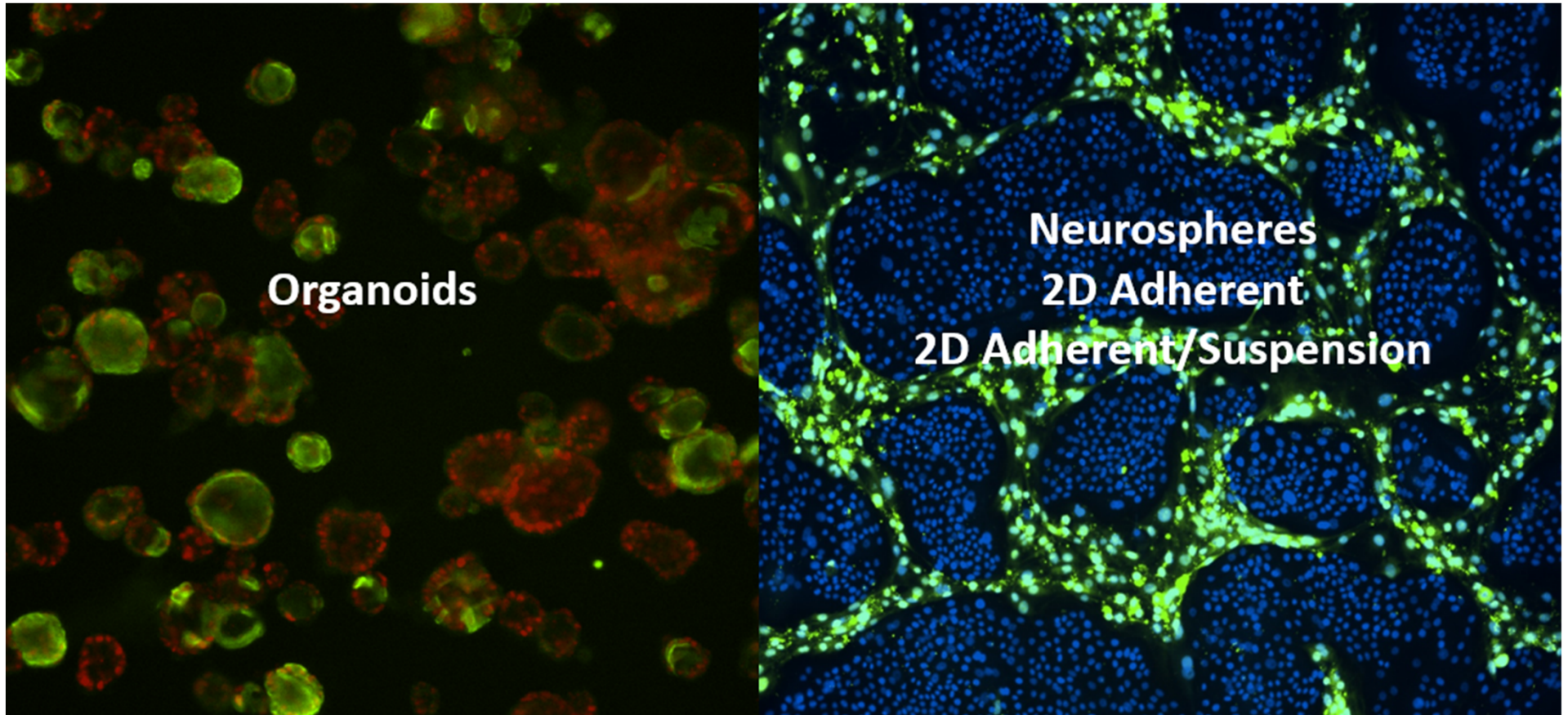
- 15X Whole Genomic Sequencing (WGS) of model, primary tumor, and normal tissue
- 150X Whole Exome Sequencing (WXS) of model, primary tumor, and normal tissue
- RNA-seq of model and primary tumor

Clinical

- Disease diagnosis
- Patient demographics
- Treatment and outcomes



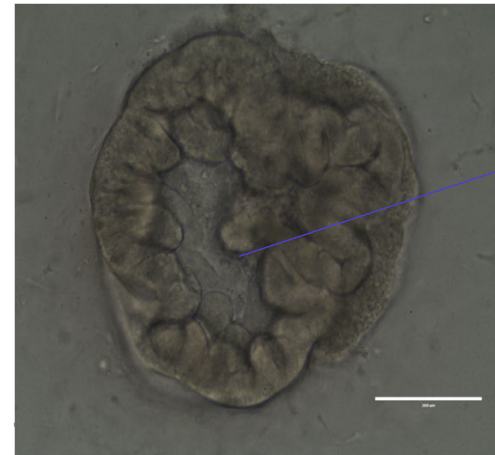
Advanced culture technologies



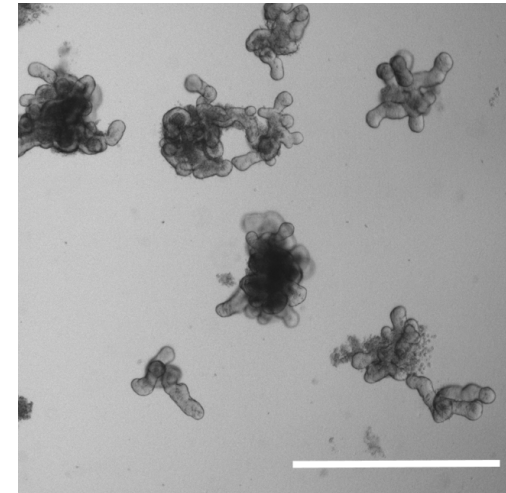
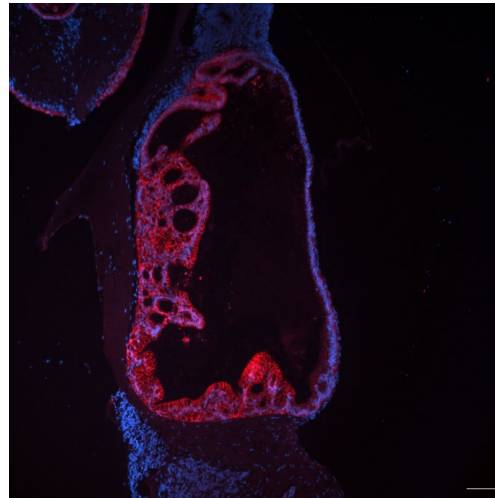
What is an HCMI Organoid?

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

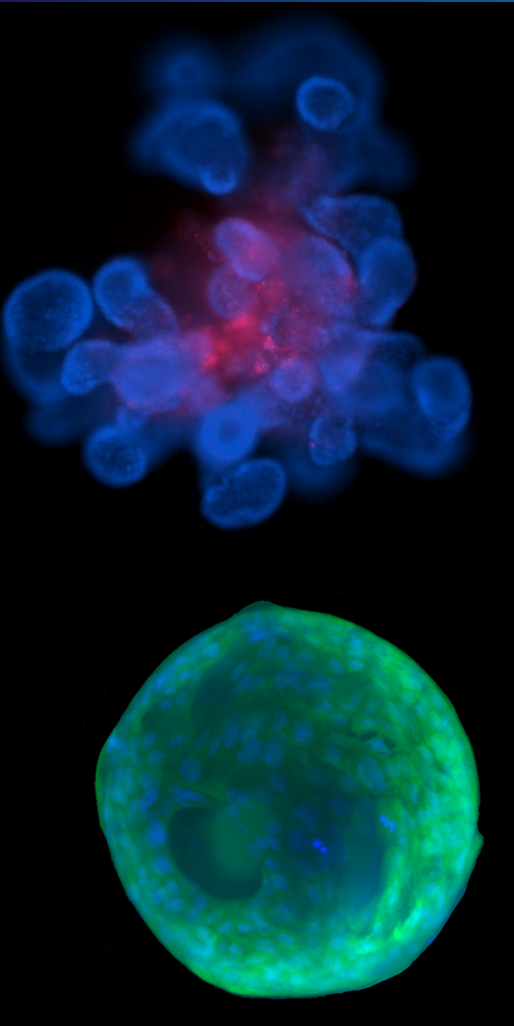
- Patient derived
- Multiple cell types
- Cellular polarization
- In vivo like architectural features (lumen)
- Long term expansion
- Phenotypically and genetically stable



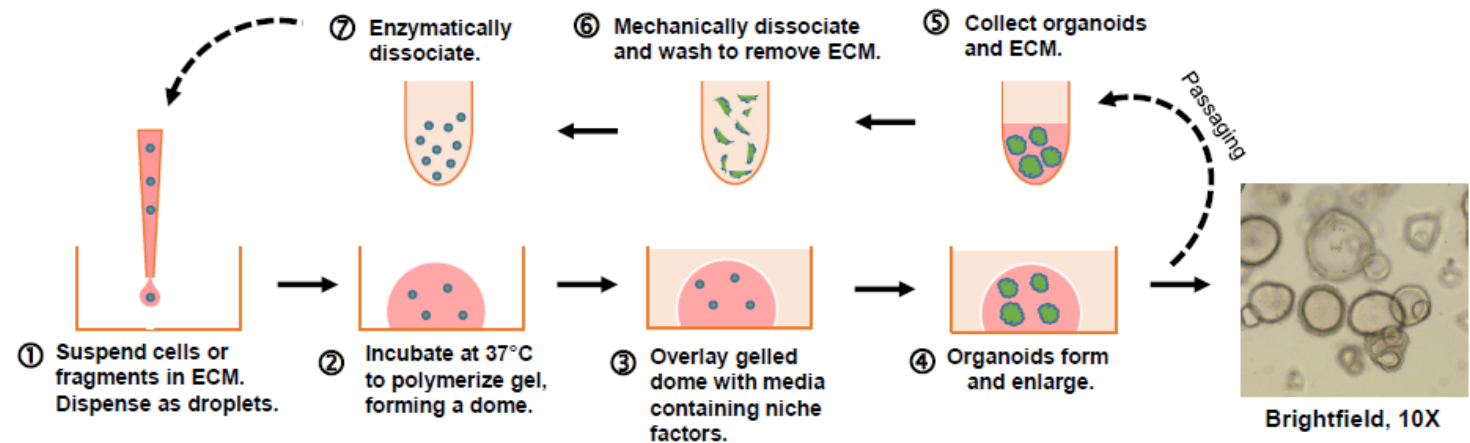
Lumen



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
 Brain 32
 Colon 23
 Skin 16
 Esophagus 15
 14 More

Research Somatic Variant Type
 Missense Mutation 57
 Silent 57
 Nonsense Mutation 56
 Intron 55
 13 More

Consequence
 Missense Variant 57
 Synonymous Variant 57
 Stop Gained 56
 Intron Variant 55
 43 More

Type
 3-D: Organoid 82
 2-D: Adherent 37
 3-D: Other (e.g. neurosphere, air-liquid interface, etc.) 15
 2-D: Conditionally reprogrammed cells 11
 1 More

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:

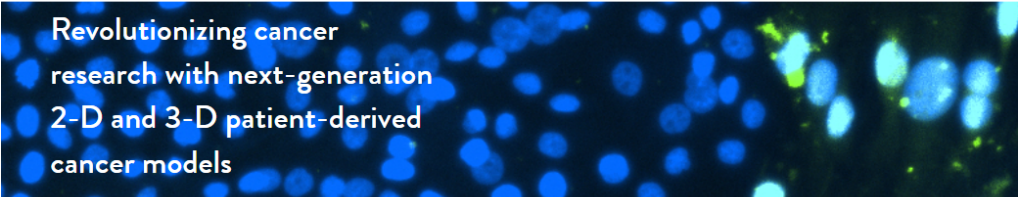
- Data Portal
- Website
- Data Transfer Tool
- API
- Data Submission Portal
- Documentation
- Legacy Archive

- 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



Revolutionizing cancer
research with next-generation
2-D and 3-D patient-derived
cancer models

The [Human Cancer Models Initiative \(HCMII\)](#) is an international consortium that is dedicated to generating novel human tumor-derived culture models with associated genomic and clinical data. The [HCMII consortium](#) comprises funding agencies and cancer model development institutions. The consortium's funding agencies include the [National Cancer Institute \(NCI\)](#), [Cancer Research UK \(CRUK\)](#), [Hubrecht Organoid Technology \(HUB\)](#), and [Wellcome Sanger Institute \(WSI\)](#). NCI-funded model development institutions include the [Broad Institute](#) and the [Cold Spring Harbor Laboratory](#). CRUK and WSI co-fund organoid development in the United Kingdom; CRUK provides the patient samples, while WSI derives and sequences the organoid models. The foundation HUB is a Netherlands-based not-for-profit organization that derives and sequences organoid models. ATCC was selected as the sole distributor for the HCMII models. The generating institutions deposit the models into ATCC, where they are authenticated, expanded, preserved, and made available for global distribution. [The HCMII model data](#) are available from the NCI as a resource to the research community.

HCMII Searchable Catalog



The HCMII Searchable Catalog is available from the NCI as a resource to the research community. Users are able to query the continuously updated resource and access information on all the available next-generation models developed by HCMII. Within the catalog, users can search by patient demographics, tumor, and model elements including diagnosis age, sex, treatment information, clinical tumor diagnosis, primary site, clinical stage, model type (eg, 3-D organoid, 2-D conditionally reprogrammed cells), and open-access masked somatic MAF variants, etc. ATCC is the designated sole distributor for the models, and researchers can acquire the models directly from ATCC.

SEARCH HCMII DATA

www.atcc.org/HCMII

- 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
 - Media formulations with Organoid Growth Kits
 - Thawing/subculturing/freezing guides
- Model pages link to other resource pages that host clinical and sequencing data
- Frequently asked questions

Where we are now

Over the past two years, ATCC has worked with NCI and the model developers to launch over 240 next generation models including **over 155 organoid models**

Types

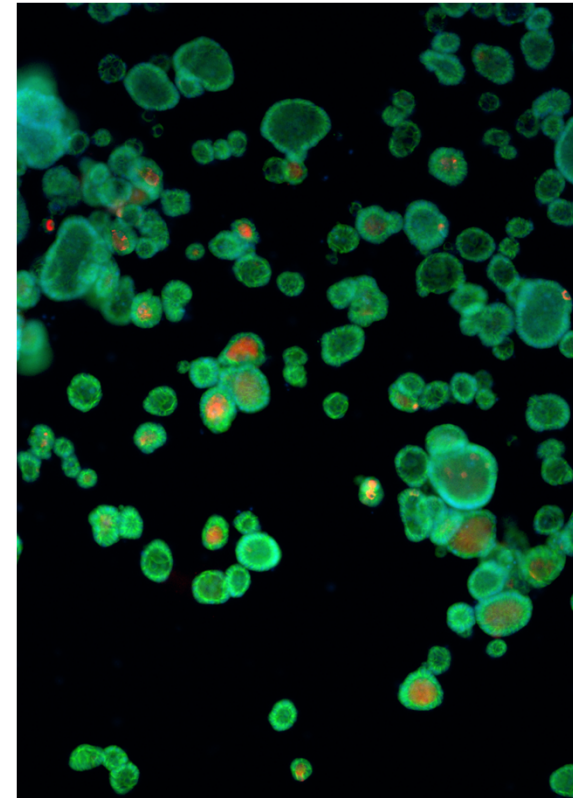
- Adenocarcinoma
- Carcinoma

Stages

- Primary
- Recurrent
- Metastatic
- Pre-malignant

Tissues

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



Detailed Support for Organoid Culture

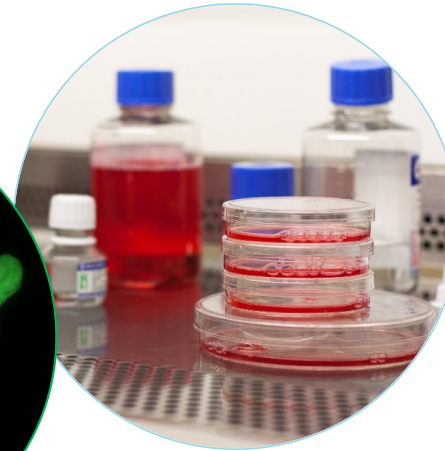
Protocols

- Subculturing
- Thawing
- Freezing



Formulations

- Complete list of components
- Medium – Reagents



Organoid Growth Kits

- Reagents specific to models
- Recombinant proteins / chemicals



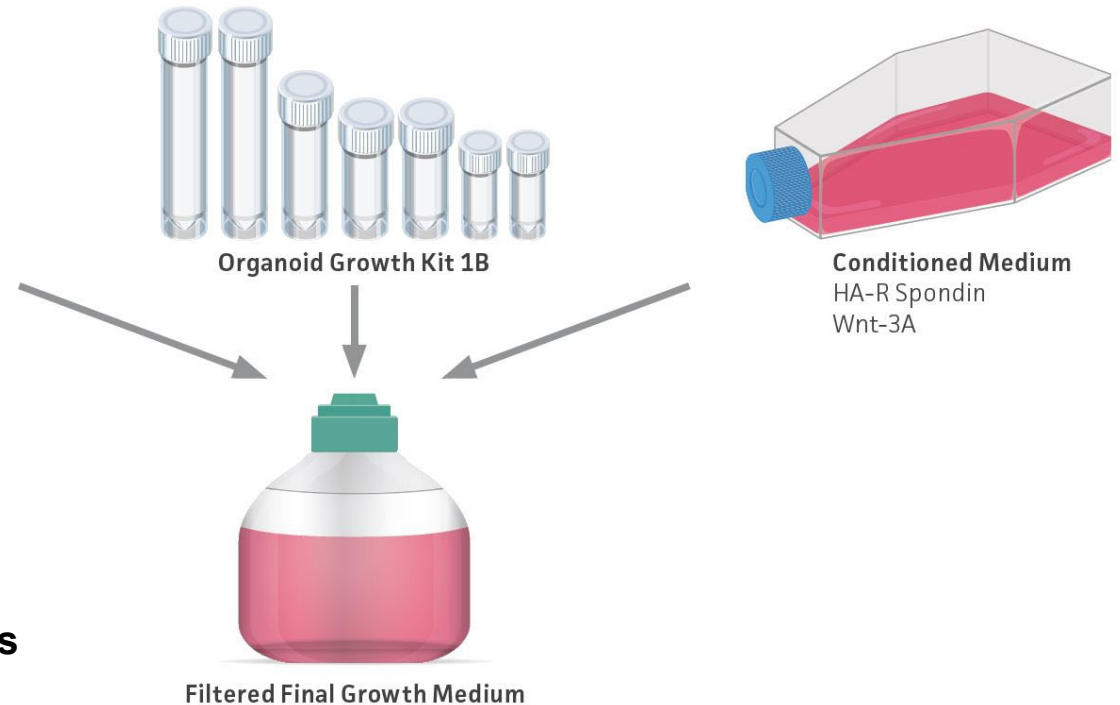
Organoid Growth Kits

- Easy to use
- Single use Kits
- No complex calculations
- No need to buy bulk reagents



Basal Medium
Advanced DMEM/F12
B-27™
HEPES
L-Glutamine

EXAMPLE ORGANOID MEDIA PREPARATION WORKFLOW

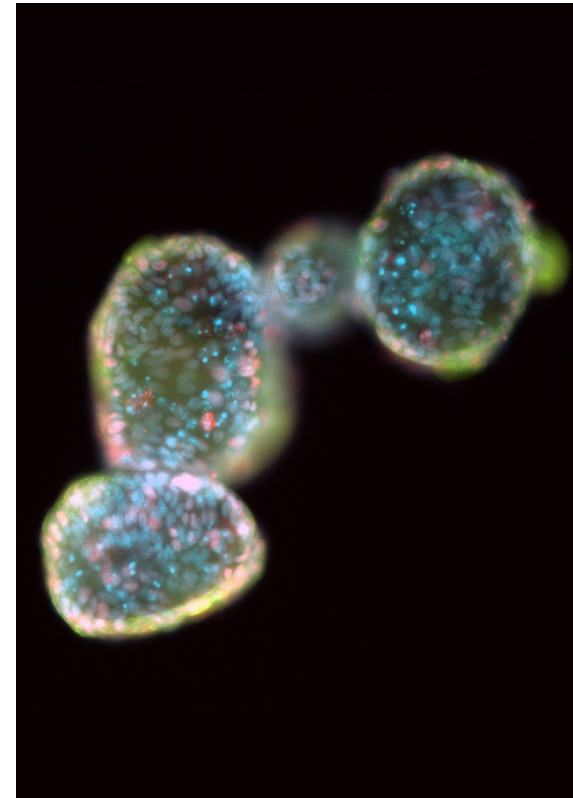


We Use these Growth Kits in the manufacturing of all Organoid models

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 over 240 models with more models being launched on a continuous basis.
- For more information, download the Organoid Culture guide or re-watch the organoid cell culture video available on the ATCC website

www.atcc.org/organoidkits



Learn more: www.atcc.org/organoidkits

Coming soon!

Evaluating the Differentiation Potential of Primary Airway Cells in 3-D Models

Presenter: Kevin Tyo, PhD

October 6, 12:00 ET

Luciferase Reporter Cancer Cell Lines: Facilitate Your CAR-T Development

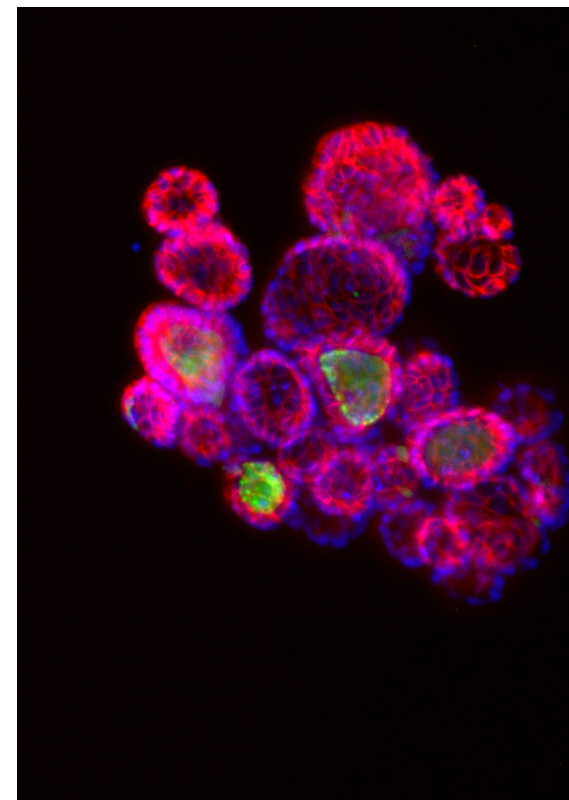
Presenter: John Foulke, MS

October 13, 12:00 ET

Does Differentiation Matter? Comparing the Toxicological Response Between Airway Epithelial Models

Presenter: Kevin Tyo, PhD

November 3, 12:00 ET



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