100 Years of Collecting Biological Materials: The Diversity of the ATCC® Collection and its use as Biological Standards

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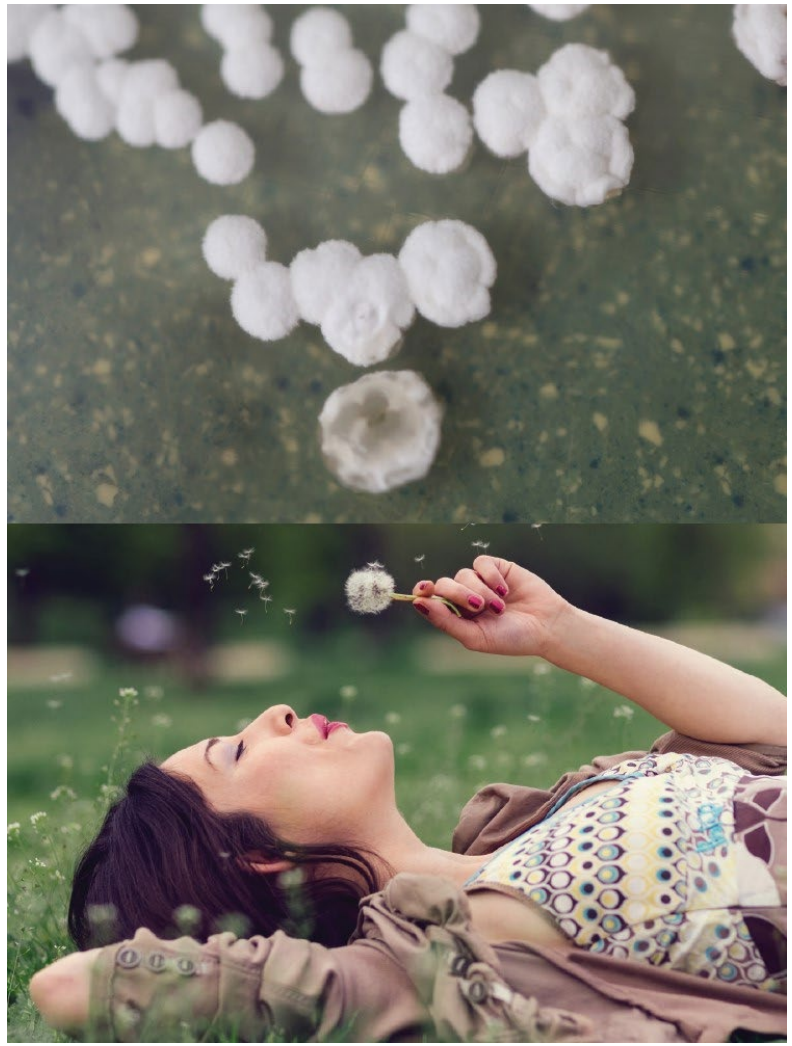
Agenda



1 The ATCC collection

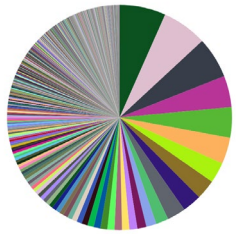
2 In vitro derivatives and standards

3 Summary

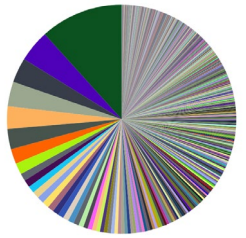
The ATCC® Collection

ATCC® is a global leader in providing authenticated, high-quality biological resources and standards for industry, academia, and government.

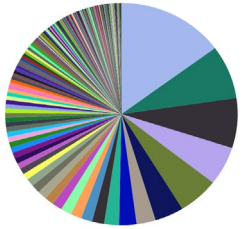
- Founded in 1925, ATCC® is a private, nonprofit, global biological resource center and standards organization
- World's trusted, premier biological materials resource and standards development organization:
  - 4,000 cell lines
  - 70,000 microorganisms
  - Genomic & synthetic nucleic acids
  - Media/reagents
  - Reference genomes
  - Advanced cell models
- Worldwide cold chain reach in >150 countries via direct ship and network of 20 distributors



Bacteriology
1226 genera



Mycology
1864 genera



Virology
200 genera

ISO 9001 Quality Management

ISO 13485 Medical Devices Quality Management

ANAB ACCREDITED ISO/IEC 17025 TESTING LABORATORY

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

Authentication

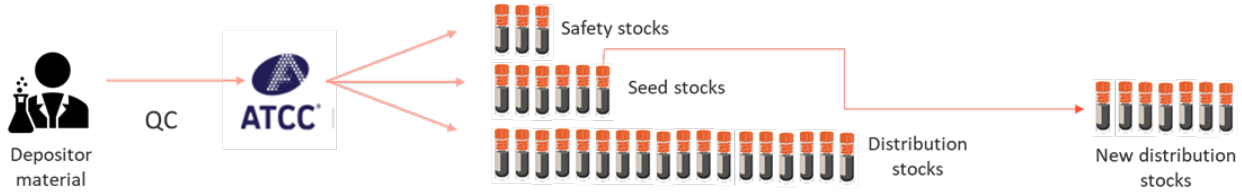
ATCC® stocks provide reliable, authenticated, traceable material

Microbial Authentication

- Genotypic & proteotypic analyses
  - Whole-genome sequencing (ATCC® Genome Portal)
  - Marker sequencing (16S rRNA and ITS)
  - MALDI-TOF MS
- Phenotypic and functional analyses
  - Colony morphology
  - Biochemical profiling
  - Serotype
  - Antibiotic resistance
  - Virulence

Cell Biology Authentication

- Human Cell STR Profiling
- Mouse STR Profiling
- Mycoplasma testing



ATCC® Genome Portal

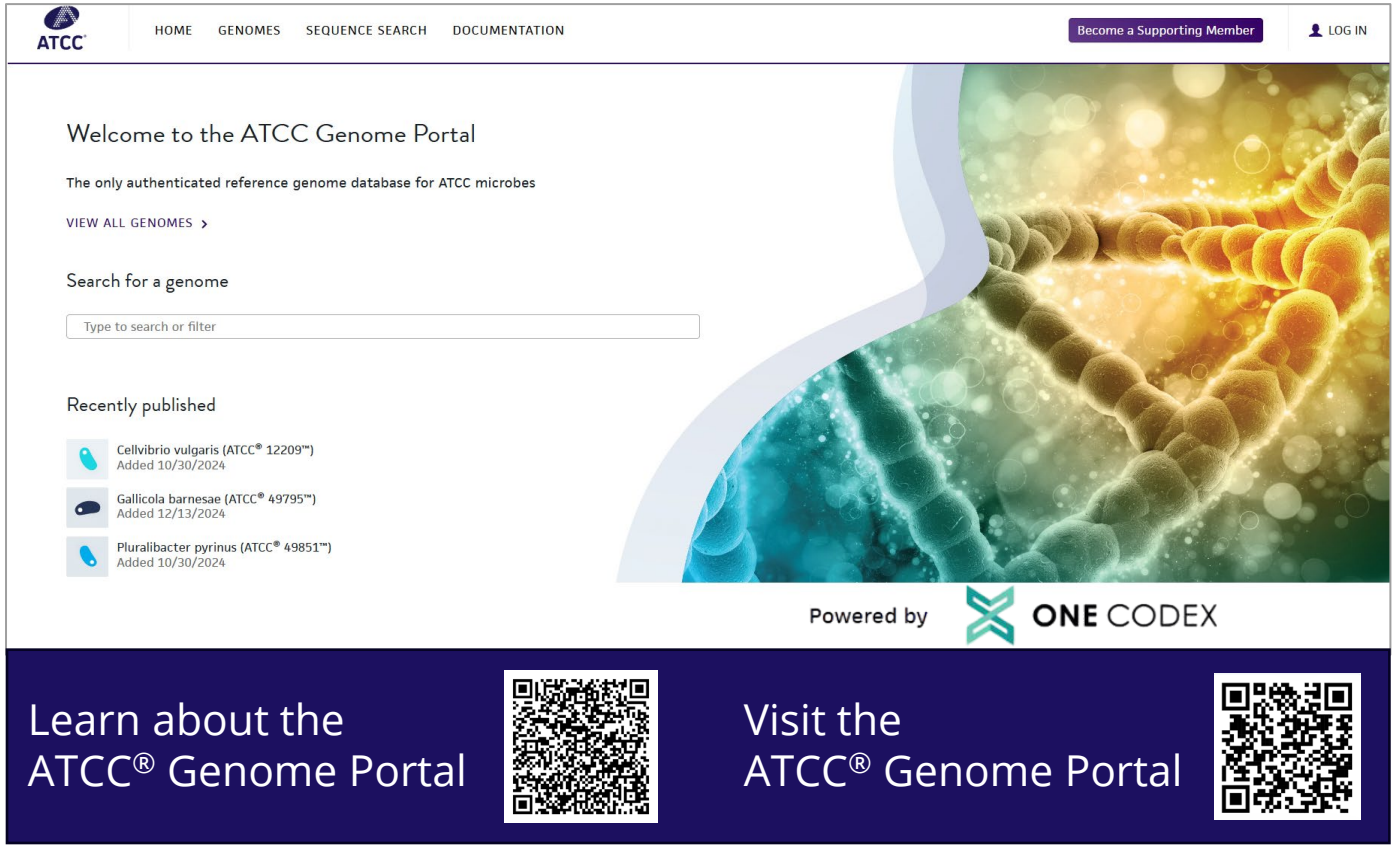
The only authenticated reference genome database for ATCC® microbes

The ATCC® Genome Portal (AGP) is a rapidly growing ISO 9001–compliant database of high-quality reference genomes from authenticated microbial strains in the ATCC® collection. Customers can easily access and download meticulously curated whole-genome assemblies for purchased strains and *Supporting Members* have full access to the AGP.

5,750

Available reference genomes
as of August 2025

- Download genome assemblies for ATCC® microbes.
- Search for nucleotide sequences or genes within published genomes.
- Search for genomes by taxonomic name, taxonomic level, isolation source, ATCC® catalog number, type strain status, and biosafety level.
- View genome assembly statistics and quality metrics.
- Identify the relatedness of published genomes by total genome alignment.



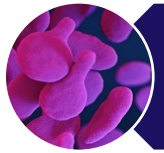
New genomes are released at the end of every quarter.

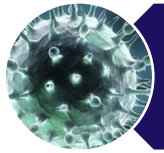
In Vitro Derivatives and Standards

Standards and Controls

Committed to providing trustworthy reference materials and standards to support reproducibility in the life sciences


Pharmaceutical Testing


Mycoplasma Testing


Water Testing


Food Testing

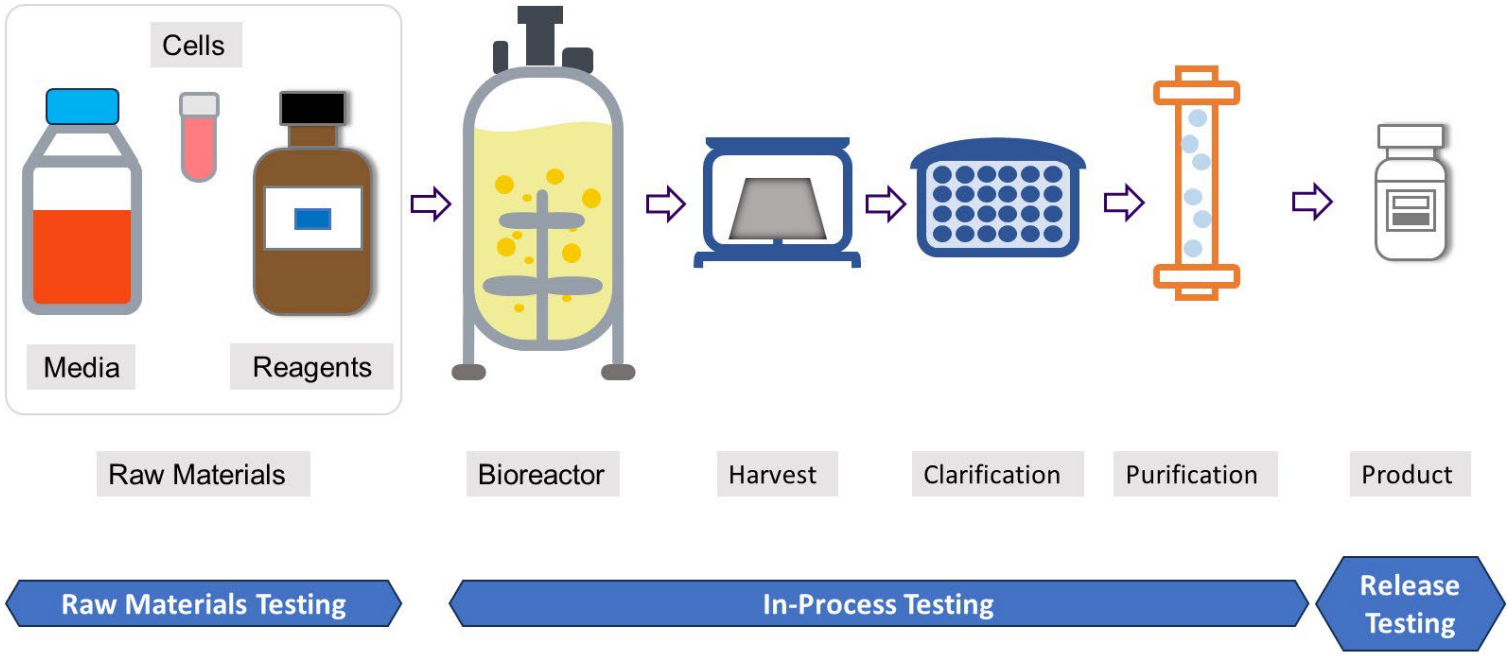

Standards Development

In 2007, ATCC® became the first biological resource organization to become accredited by **American National Standards Institute (ANSI)** as a Standards Development Organization (SDO).

ATCC published the following voluntary consensus standards:

- Standardization of In Vitro Assays to Determine Anthrax Toxin Activities (ASN-0001)
- Authentication of Human Cell Lines: Standardization of Short Tandem Repeat (STR) Profiling (ASN-0002)
- Species-Level Identification of Animal Cells through Mitochondrial Cytochrome C Oxidase Subunit 1 (CO1) DNA Barcodes (ASN-0003)

Bioproduction Tools



Learn about our tools for bioproduction

Bioproduction cell lines and microbes

- Protein production cell lines
- Enhanced virus production cell lines
- Antibiotic production microbes
- Organic Acid production bacteria
- Biofuel production microbes

Reference materials for testing for contaminants during bioproduction

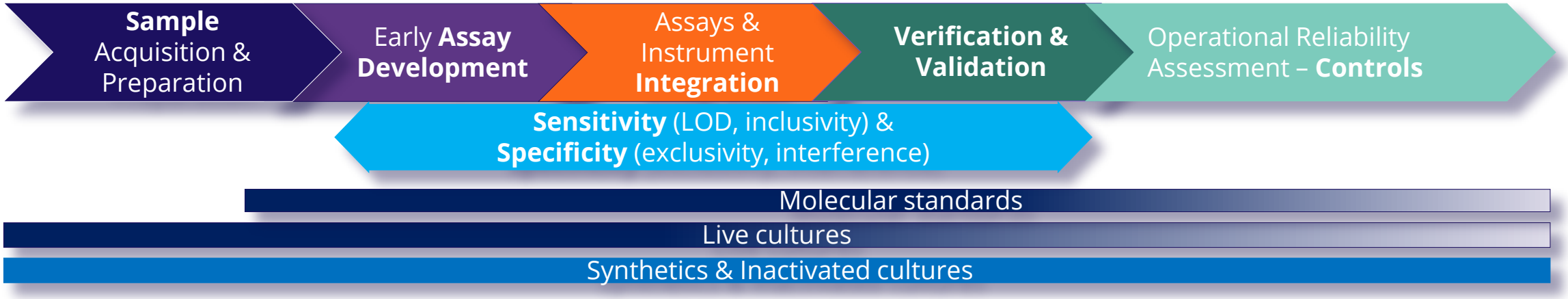
- Host cell DNA
- Microbial certified reference materials
- MicroQuant™ by ATCC® (USP <51> <60>, <61>)
- Viral reference materials
  - Lentivirus
  - Human Adenovirus 5
  - Recombinant AAV2 and AAV8

MicroQuant™ by ATCC®

Innovation	Quantitative pellet created by an internally developed proprietary cryopreservation innovation
Value Add	Storage at 2°C to 8°C. Rehydrates rapidly and uniformly at room temperature
Intended Use	Microbial QC testing
Assays	Support for USP monographs: • USP <51> Antimicrobial effectiveness testing • USP <60> Tests for *Burkholderia cepacia* complex • USP <61> Bioburden testing • USP <62> Bioburden testing: tests for specific microorganisms • USP <71> Sterility testing
Format	1 kit containing : 5 vials of cryopreserved pellets 5 vials of rehydration buffer

Learn more at
www.atcc.org/microquant

Molecular Diagnostics Tools



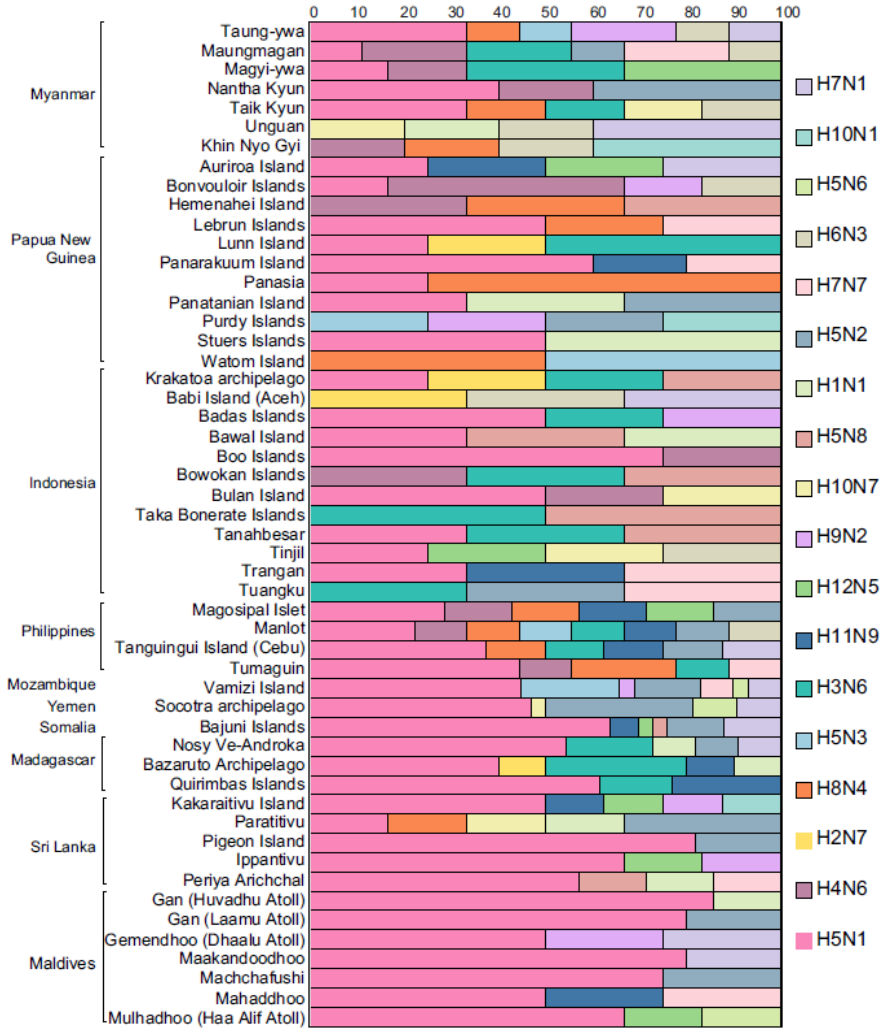
Each stage of the development pipeline requires different materials → complementary materials allows for rapid assay development

Reference Material	Benefit	Disadvantage
Live microbes	Sustainable source, maintains complexity of the intact microorganism, provides entire genome	Difficulty accessing materials, biosafety
Inactivated materials	Ability to access to pathogens in BSL 1 labs	Cells may no longer perform as live microbe
Genomic DNA/RNA	Ease of access, safe to use	May not mimic live microbe
Synthetic oligonucleotides	Easy to design and synthesize, allows access to non-culturable materials	May not resemble complexity of the whole genome

Learn more about our genomic and synthetic molecular standards

Case Study: Avian Influenza (H5N1) VR-3436SD™

- Avian influenza viruses (AIVs) are a growing global health threat
- We developed a synthetic avian influenza (H5N1) for use as a validation control in surveillance assays
  - Two transcript design covering 5 genome segments:
    - Transcript A contains HA and NP
    - Transcript B contains M1/M2, NA, and NEP/NS
- An international consortium of academic and industrial partners used our product to validate an qRT-PCR assay for surveillance of birds from Asia



Detection of Influenza in bird guano by site

nature communications

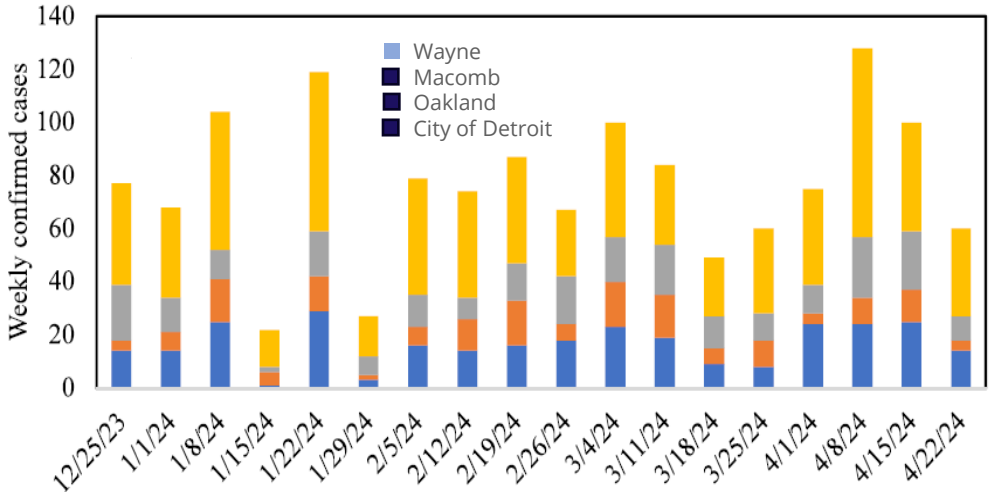
Article

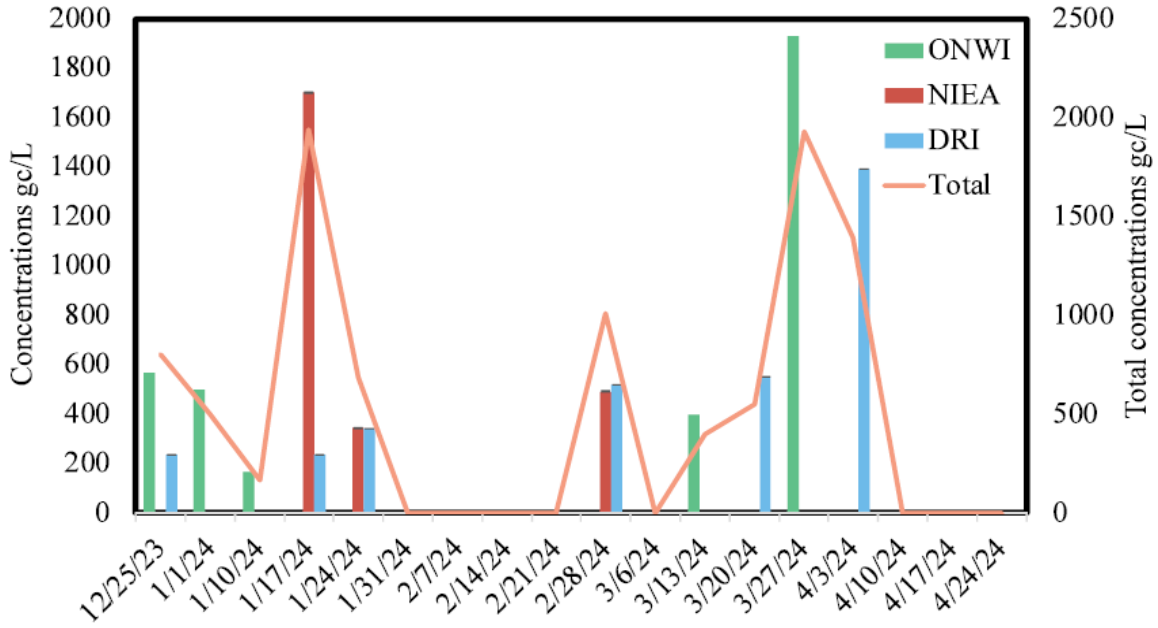
https://doi.org/10.1038/s41467-025-59322-z

Surveillance of avian influenza through bird guano in remote regions of the global south to uncover transmission dynamics

Case Study: Wastewater Monitoring of STIs

- Chlamydia, Trachoma, and Syphilis are common sexually transmitted bacterial infections (STIs)
- The infections are mostly asymptomatic, which increases the risk of transmission
- Wastewater monitoring can be used to monitor community burden → increase targeted testing
- We developed a synthetic *Treponema pallidium* product (BAA-2642SD™) that was used to validate a ddPCR assay for wastewater screening





Environmental Science & Technology

pubs.acs.org/est

Article

Tracking Chlamydia and Syphilis in the Detroit Metro Area by Molecular Analysis of Environmental Samples

Liang Zhao, Heidy Peidro Guzman, and Irene Xagoraraki*

Cite This: *Environ. Sci. Technol.* 2024, 58, 17606–17616

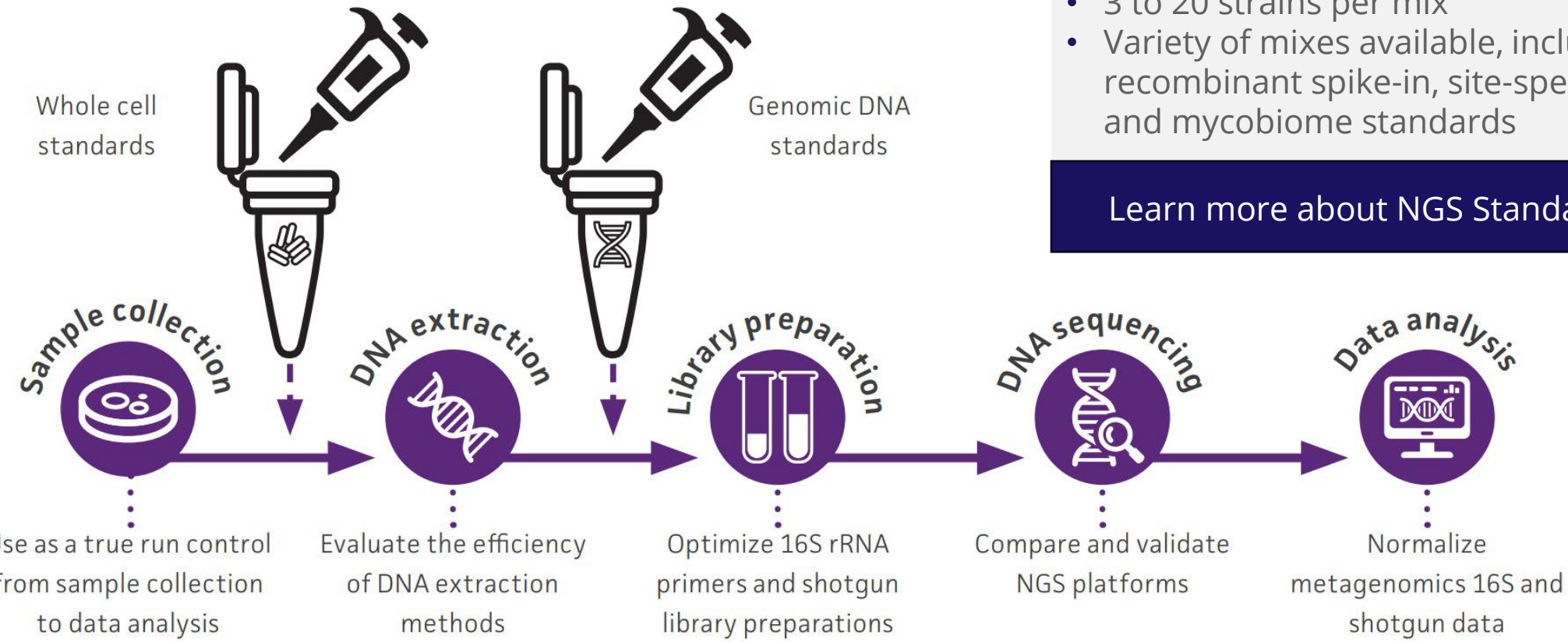
Read Online

Metagenomics Standards

Whole cell and genomic mock microbial communities

- Whole cell and nucleic acid mixes
- Even or staggered gDNA abundance
- Low, medium, or high levels of complexity
- 3 to 20 strains per mix
- Variety of mixes available, including recombinant spike-in, site-specific, virome, and mycobiome standards

Learn more about NGS Standards



Plant Pathogens as Reference Materials

Challenge:

- Crop losses due to fungal pathogens are > $200 billion annually and they are responsible for 85% of all plant diseases.

ATCC's ® Solution:

- ATCC® has 1,400 species of fungal and oomycete plant pathogens encompassing 340 genera.
- We have 109 APHIS-regulated fungal pathogens from 16 major US crops.
- Many of these pathogens are reference strains that could be use as plant pathogen standards.

Read our blog post:
"Precision in Plant Health – ATCC's Role in Advancing Plant Pathogen Standards"

Summary

We offer a range of products to accelerate your R&D needs

- ATCC® is a long-time **trusted partner** for high-quality authenticated biomaterials, standards, and services in the life sciences.
    - Diverse collection of microbial and cell cultures
    - ATCC® continues to support the development and implementation of diagnostics and surveillance tests with reliable authenticated reference materials
    - Genomic DNA standards are ready-to-use reference materials eliminating additional costs and time required for cell line expansion, DNA extraction, and quantitation
    - Synthetic standards provide controls for organisms that are difficult to culture or extract
    - Metagenomics standards comprising whole cells or quantitative nucleic acids from organisms in even and staggered mixtures
- History of **partnerships** with **industry, government, and academia** to improve **human health,** agriculture, veterinary, environment, etc.
- What do **YOU** need?
    - ATCC® exists as a resource for the scientific community

ATCC®

CREDIBLE LEADS TO INCREDIBLE

Questions

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Appendix

Molecular Analytical Reference Materials

Genomic Analytical Reference Materials

ATCC® has a portfolio of 270+ products from:

- Blood-borne disease
- Gastro-intestinal disease
- Respiratory disease
- Sexually transmitted disease
- Vector-borne disease pathogens

Authentication

- Identity: Amplicon sequencing
- Integrity: High-molecular-weight NA by gel electrophoresis

Synthetic Molecular Standards

ATCC® has a portfolio of 75+ products from:

- Gastrointestinal disease
- Respiratory disease
- Sexually-transmitted disease
- Vector-borne disease pathogens

- Manufactured under ISO13485 guidance

Authentication

- Identity: NGS to verify synthetic sequence
- Function: qPCR 3.32 cycles between Cq threshold

Learn more about our genomic and synthetic molecular standards

ATCC® Microbiome Standards Portfolio

Preparation	ATCC® Catalog No.	Number of Organisms	Composition	Complexity	Utility
Genomic DNA	MSA-1000™	10	Even	Medium	Standards for assay development and optimization
	MSA-1001™	10	Staggered	Medium	
	MSA-1002™	20	Even	High	
	MSA-1003™	20	Staggered	High	
Whole cell	MSA-2003™	10	Even	Medium	
	MSA-2002™	20	Even	High	
Genomic DNA	MSA-4000™	11	Staggered	Medium	NGS-based pathogen detection
Genomic DNA	MSA-3000™	6	Even	Low	Environmental studies
	MSA-3001™	10	Even	Medium	
	MSA-3002™	10	Staggered	Medium	

ATCC® Site-specific NGS Standards

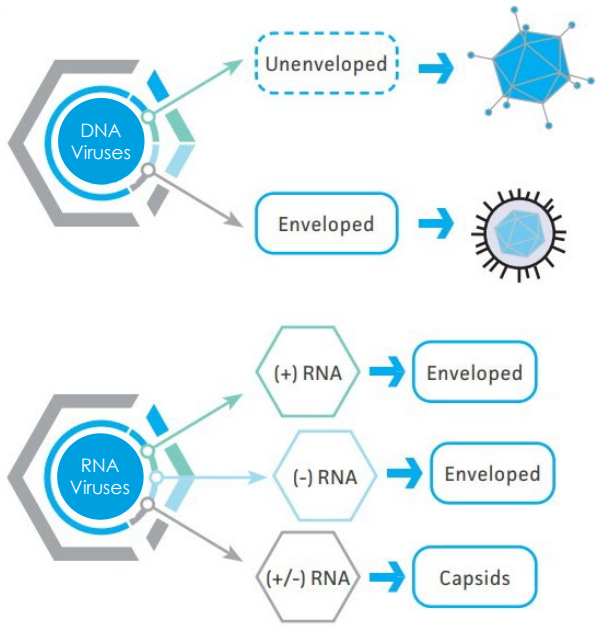
Standard	Preparation	ATCC® Catalog No.	Number of Organisms	Importance
Oral	Whole cell	MSA-2004™	6	• Mock microbial communities representing the oral, skin, gut, and vaginal microbiomes • Comprises normal and atypical flora • Anaerobic and aerobic microbial strains • A combination of Gram-positive and Gram-negative bacterial cultures • Even composition
	Genomic DNA	MSA-1004™		
Skin	Whole cell	MSA-2005™	6	
	Genomic DNA	MSA-1005™		
Gut	Whole cell	MSA-2006™	12	
	Genomic DNA	MSA-1006™		
Vaginal	Whole cell	MSA-2007™	6	
	Genomic DNA	MSA-1007™		

ATCC® Spike-in and Mycobiome Standards

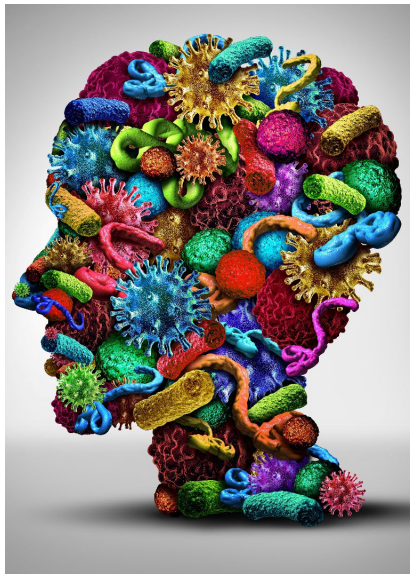
Standard	Preparation	ATCC® Catalog No.	Number of Organisms	Application
Spike-in	Whole cell	MSA-2014™	3	• Microbiome measurements and data normalization • 16S rRNA and shotgun assay verification, validation, and quality control
	Genomic	MSA-1014™		

Standard	Preparation	ATCC® Catalog No.	Number of Organisms	Application
Mycobiome	Whole cell	MSA-2010™	10	• Fungal mock community standards for assay development, optimization, verification, and validation; evaluating reproducibility; and use as a daily run quality control
	Genomic	MSA-1010™		

Reference Materials for Viral Metagenomics



Composition of Virome Analytical Refence Materials
Human herpesvirus 5 strain AD169 (ATCC® VR-538™)
Human mastadenovirus strain F (ATCC® VR-931™)
Influenza B virus strain B/Florida/4/2006 (ATCC® VR-1804™)
Zika virus strain MR 766 (ATCC® VR-1838™)
Reovirus 3 strain Dearing (ATCC® VR-824™)
Human respiratory syncytial virus strain A2 (ATCC® VR-1540™)



Intended Use	Content	ATCC® Catalog No.	Number of Organisms	Specification (ddPCR)	Applications
Virome Analysis	Virus Mix	MSA-2008™	6	2×10^3 genome copies/µL per virus	• Assay development, optimization, verification, and validation. • Reproducibility assessment (routine QC).
	Nucleic Acid Mix	MSA-1008™	6	2×10^4 genome copies/µL per virus	

ddPCR is a registered trademark of Bio-Rad Laboratories, Inc.

Influenza Synthetic RNA Products

Quantitative BSL-1 analytical reference materials

ATCC® Product	Influenza strain used for design (subtype/lineage)
VR-3384SD™	B/Malaysia/2506/2004 (Victoria lineage)
VR-3385SD™	B/Brisbane/60/2008 (Victoria lineage)
VR-3386SD™	A/Brisbane/59/07 (H1N1)
VR-3387SD™	A/Hiroshima/52/2005 (H3N2)
VR-3388SD™	A/Netherlands/2629/2009 (H1N1pdm2009)
VR-3436SD™	A/white-tailed eagle/Japan/OU-1/2022 (H5N1)
VR-3437SD™	A/Shanghai/4664T/2013 (H7N9)
VR-3438SD™	A/chicken/Wenzhou/334b/2013 (H7N7)
VR-3439SD™	A/goose/Guangdong/GS018/2015 (H5N6)
VR-3440SD™	A/ostrich/Yunnan/438/2014 (H9N2)

ATCC has Oncology Standards for Human Cell Lines

ATCC® quantified human genomic DNAs

Cell lines from relevant diseases | Quantified biomarker | Mut. allelic freq. | Absolute gene copies | CNV

ATCC® No.	Purified from Cell Line	Disease	Quantified Oncology Bio-marker	Report mutation allelic frequency *	Report absolute gene copies / ng DNA **	Report relative gene copy number **
CRL-1648DQ™	CA46	Burkitt's lymphoma	TP53 R248Q	√	√	√
HTB-30DQ™	SK-BR-3	Breast adenocarcinoma	TP53 p.R175H	√	√	√
HTB-122DQ™	BT-549	Breast ductal carcinoma	TP53 p.R249S	√	√	√
HTB-131DQ™	MDA-MB-453	Breast carcinoma	PIK3CA p.H1047R	√	√	√
CCL-225DQ™	HCT-15	Colon adenocarcinoma	KRAS p.G13D	√	√	√
CCL-227DQ™	SW620	Colon adenocarcinoma	KRAS p.G12V TP53 p.R273H	√ √	√ √	√ √
CCL-231DQ™	SW48	Colon adenocarcinoma	EGFR p.G719S	√	√	√
CL-187DQ™	LS180	Colon adenocarcinoma	KRAS p.G12D	√	√	√
CRL-2158DQ™	LS1034	Colon carcinoma	TP53 p.G245S	√	√	√
CRL-5973DQ™	SNU-5	Stomach undifferentiated adenocarcinoma	MET amplification	–	√	√
CRL-5974DQ™	SNU-16	Stomach undifferentiated adenocarcinoma	MYC amplification	–	√	√
HTB-111DQ™	AN3 CA	Endometrium adenocarcinoma	PTEN p.R130fs	√	√	√
CRL-2868DQ™	HCC827	Lung adenocarcinoma	EGFR pELREA746del EGFR amplification	√ –	√	√
CRL-5908DQ™	NCI-H1975	Lung non-small cell carcinoma	EGFR p.T790M; EGFR p.L858R	√	√	√
CRL-2177DQ™	SW 1271	Lung small cell carcinoma	NRAS p.Q61R	√	√	√
CRL-5928DQ™	NCI-H2170	Lung squamous cell carcinoma	HER 2 amplification	–	√	√
CRL-7898DQ™	A101D	Skin malignant melanoma	BRAF p.V600E	√	√	√

CRM cell lines and DNAs

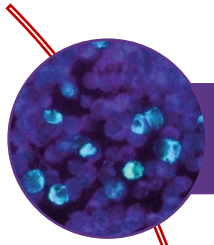
Stated level of confidence for traceability and values of uncertainty

ATCC® No.	Cell line name	Amino acid change	DNA change
CRM-TIB-161™	HuT 78	**WT**	WT
CRM-CCL-119™	CCRF-CEM	**p.G12D**	c.35G>A
CRM-CCL-185™	A549	**p.G12S**	c.34G>A
CRM-CRL-1420 ™	MIA PaCa-2	**p.G12C**	c.34G>T
CRM-HTB-174™	NCI-H441	**p.G12V**	c.35G>A
CRM-CRL-3211™	PSN1	**p.G12R**	c.34G>C
CRM-CCL-155™	RPMI 8226	**p.G12A**	c.35G>C
CRM-HTB-26™	MDA-MB-231	**p.G13D**	c.38G>A

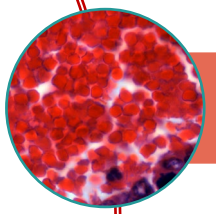
BRAF, EGFR, ERBB2, KRAS, NRAS, MET, MYC, PIK3CA, pTEN, TP53

Find out more

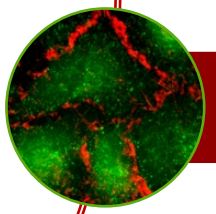
ATCC has Tumor Normal Matched Cell Line Pairs



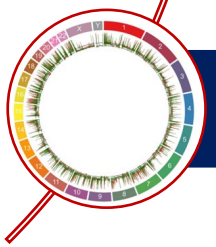
Over 40 pairs of tumor/normal donor matched ATCC® cell lines



Major cancer types: lung, breast, skin, bone

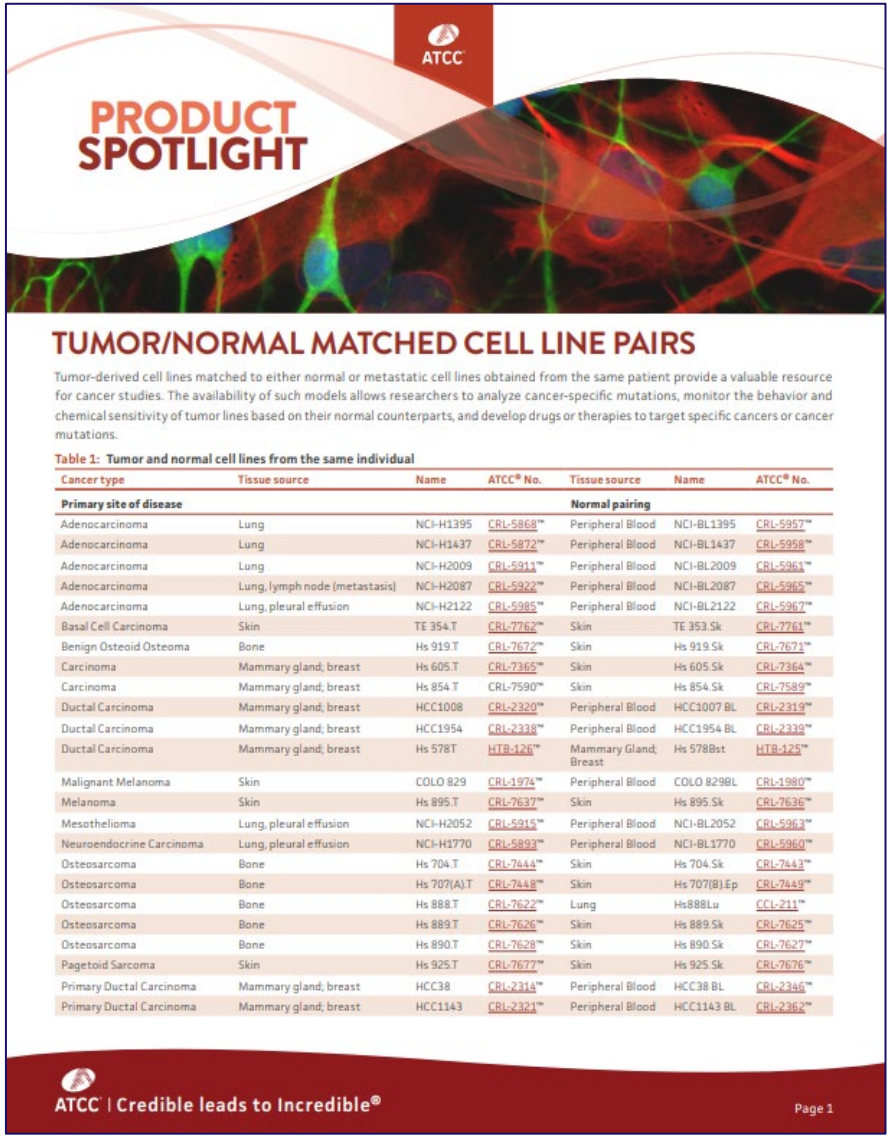


Allows for study on cancer-specific mutations, tumor mutation burden (TMB)



Well-characterized reference cell lines associated with WGS and WES datasets

Find out more



ATCC

PRODUCT SPOTLIGHT

TUMOR/NORMAL MATCHED CELL LINE PAIRS

Tumor-derived cell lines matched to either normal or metastatic cell lines obtained from the same patient provide a valuable resource for cancer studies. The availability of such models allows researchers to analyze cancer-specific mutations, monitor the behavior and chemical sensitivity of tumor lines based on their normal counterparts, and develop drugs or therapies to target specific cancers or cancer mutations.

Table 1: Tumor and normal cell lines from the same individual

Cancer type	Tissue source	Name	ATCC® No.	Tissue source	Name	ATCC® No.
Primary site of disease				**Normal pairing**		
Adenocarcinoma	Lung	NCI-H1395	CRL-5868™	Peripheral Blood	NCI-BL1395	CRL-5957™
Adenocarcinoma	Lung	NCI-H1437	CRL-5872™	Peripheral Blood	NCI-BL1437	CRL-5958™
Adenocarcinoma	Lung	NCI-H2009	CRL-5911™	Peripheral Blood	NCI-BL2009	CRL-5961™
Adenocarcinoma	Lung, lymph node (metastasis)	NCI-H2087	CRL-5922™	Peripheral Blood	NCI-BL2087	CRL-5965™
Adenocarcinoma	Lung, pleural effusion	NCI-H2122	CRL-5985™	Peripheral Blood	NCI-BL2122	CRL-5967™
Basal Cell Carcinoma	Skin	TE 354.T	CRL-7762™	Skin	TE 353.Sk	CRL-7761™
Benign Osteoid Osteoma	Bone	Hs 919.T	CRL-7672™	Skin	Hs 919.Sk	CRL-7671™
Carcinoma	Mammary gland; breast	Hs 605.T	CRL-7365™	Skin	Hs 605.Sk	CRL-7364™
Carcinoma	Mammary gland; breast	Hs 854.T	CRL-7590™	Skin	Hs 854.Sk	CRL-7589™
Ductal Carcinoma	Mammary gland; breast	HCC1008	CRL-2320™	Peripheral Blood	HCC1007 BL	CRL-2319™
Ductal Carcinoma	Mammary gland; breast	HCC1954	CRL-2338™	Peripheral Blood	HCC1954 BL	CRL-2339™
Ductal Carcinoma	Mammary gland; breast	Hs 578T	HTB-126™	Mammary Gland; Breast	Hs 578Bst	HTB-125™
Malignant Melanoma	Skin	COLO 829	CRL-1974™	Peripheral Blood	COLO 829BL	CRL-1980™
Melanoma	Skin	Hs 895.T	CRL-7637™	Skin	Hs 895.Sk	CRL-7636™
Mesothelioma	Lung, pleural effusion	NCI-H2052	CRL-5915™	Peripheral Blood	NCI-BL2052	CRL-5963™
Neuroendocrine Carcinoma	Lung, pleural effusion	NCI-H1770	CRL-5893™	Peripheral Blood	NCI-BL1770	CRL-5960™
Osteosarcoma	Bone	Hs 704.T	CRL-7444™	Skin	Hs 704.Sk	CRL-7443™
Osteosarcoma	Bone	Hs 707(A).T	CRL-7448™	Skin	Hs 707(B).Ep	CRL-7449™
Osteosarcoma	Bone	Hs 888.T	CRL-7622™	Lung	Hs888Lu	CCL-211™
Osteosarcoma	Bone	Hs 889.T	CRL-7626™	Skin	Hs 889.Sk	CRL-7625™
Osteosarcoma	Bone	Hs 890.T	CRL-7628™	Skin	Hs 890.Sk	CRL-7627™
Pagetoid Sarcoma	Skin	Hs 925.T	CRL-7677™	Skin	Hs 925.Sk	CRL-7676™
Primary Ductal Carcinoma	Mammary gland; breast	HCC38	CRL-2314™	Peripheral Blood	HCC38 BL	CRL-2346™
Primary Ductal Carcinoma	Mammary gland; breast	HCC1143	CRL-2321™	Peripheral Blood	HCC1143 BL	CRL-2362™

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