



Toxicology Portfolio

Credible Assays, Incredible Results

You don't have time to waste on failed experiments and incorrect results; you must get your *in vitro* toxicology testing right the first time. ATCC's high-quality, authenticated materials ensure that misidentification, growth problems, and donor variability issues don't slow you down. ATCC proudly offers a wide variety of cells, microorganisms, and assay materials for physiologically-relevant toxicology testing and research, including our human telomerase reverse transcriptase (hTERT)-immortalized primary cells.

Continuous Cell Lines

ATCC is home to over 4,000 continuous human and animal cell lines that can be used to refine traditional cell-based experiments or construct high-throughput assays, reducing the need for *in vivo* studies. Our continuous cell lines are always authenticated so you can rest assured that your *in vitro* models will deliver experimental success.

Human Primary Cells

Human primary cells closely mimic the physiological state of cells *in vivo* and generate relevant data representing living systems. ATCC offers quality human primary cells matched with optimized growth media and supplements and a superior viability guarantee.

- Most cells expand to 15 population doublings
- Post-thaw viability greater than 70%
- All cells tested for positive and negative surface markers
- High cell purity guaranteed
- Additional donor information available

hTERT-Immortalized Primary Cells

The best of both worlds: ATCC hTERT-immortalized primary cells are a revolutionary breakthrough in cell biology research. hTERT-immortalized primary cells do not senesce after a few passages, thereby reducing the need to repurchase and initiate growth of primary cells. Unlike continuous cell lines, these cells exhibit a stable karyotype and genotype and retain many of the physiological characteristics of the parental cells.

- *In vivo* biologies observed at high passage
- Average lifespan 5 times longer than primary cells
- Gene expression similar to the parental cell
- Zero donor (lot-to-lot) variability

Cytotoxicity

Find potential viability issues early with ATCC's wide array of biological solutions such as rodent and human cell lines, primary cells, and stem cells, including our new upcyte® Hepatocytes. We also offer assay kits such as the MTT assay, the XTT assay, and our resazurin-based Reliablue™ assay to measure your cell viability and growth.

TABLE 1. Human Primary Cells

ATCC® No.	Designation
PCS-100-013™	Human Umbilical Vein Endothelial Cells
PCS-201-010™	Normal Human Dermal Fibroblasts (Neonatal)
PCS-201-012™	Normal Human Dermal Fibroblasts (Adult)
PCS-400-010™	RPTEC Human Renal Proximal Tubular Epithelial Cells
PCS-500-010™	Human Umbilical Cord-derived Mesenchymal Stem Cells

TABLE 2. Cell Proliferation Assay Kits

ATCC® No.	Designation	Application
30-1010K™	MTT Cell Proliferation Assay Kit	Spectrophotometric measurement of cell viability and growth
30-1011K™	XTT Cell Proliferation Assay Kit	Measurement of cell viability and growth in tumor cell lines
30-1014™	Reliablue™ Cell Viability Reagent	Assessment of cell viability, cytotoxicity, metabolism, and proliferation

Reliablue™

ATCC has developed Reliablue™ (ATCC® 30-1014™), a resazurin-based cell proliferation assay that is sensitive and non-toxic to cells. It is designed to be used in a 96 (or greater) well plate, and can be used for compound screening in a high throughput format.

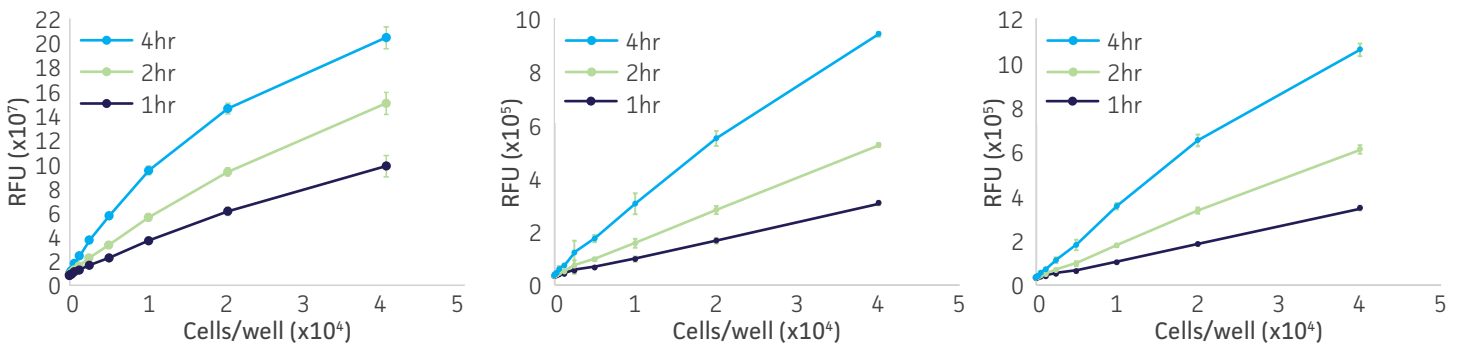


FIGURE 1. Reliablue-derived viability curves. (A) MDA-MB-231 cells, (B) A549 cells, and (C) primary human keratinocytes were seeded at the indicated number per well in 96-well plates and incubated with Reliablue for the indicated times at 37°C/5% CO₂. The fluorescent signal was recorded at ex570/em590.

Absorption, Distribution, Metabolism, and Elimination (Adme) Assays

Testing for absorption, distribution, metabolism, and elimination is crucial to moving your product to market. Get closer results to those observed *in vivo* and rule out possible toxicities faster using our entire ADME portfolio, featuring our hTERT-immortalized OAT1-, OCT2-, and OAT3-expressing kidney transporter cells. ATCC is here to support your preclinical research with our renal and hepatic models to be used in metabolic stability, metabolite identification, and drug-drug interaction assays.

TABLE 3. Hepatic cells

ATCC® No.	Designation	Product Description	Disease State
ACS-9000™	upcyte® Hepatocytes	<i>Homo sapiens</i> ; liver; immortalized cell line	Normal
CRL-2254™	AML-12	Musculus; liver; primary cells	Normal
CRL-2643™	ZFL [ZF-L]	Danio rerio; liver; immortalized cell line	Normal
CRL-10741™	C3A [HepG2/C3A, derivative of Hep G2]	<i>Homo sapiens</i> ; liver; immortalized cell line	Hepatocellular carcinoma
CRL-11233™	THLE-3	<i>Homo sapiens</i> ; liver; immortalized cell line	Hepatocellular carcinoma
HB-8065™	Hep G2	<i>Homo sapiens</i> ; liver; immortalized cell line	Hepatocellular carcinoma

TABLE 4. Human Hepatocyte Medium Kit

ATCC® No.	Designation	Basal medium	Medium Supplements
ACS-9005™	Hepatocyte High Performance Medium Kit	Hepatocyte High Performance Medium (ATCC® ACS-9001™)	Hepatocyte High Performance Medium Supplements (ATCC® ACS-9002™)

TABLE 5. Renal Cell Lines

ATCC® No.	Designation	Source Tissue
CRL-1573™	293 [HEK-293]	Embryonic kidney
CRL-2190™	HK-2	Kidney, cortex/proximal tubule
CRL-3213™	Phoenix-AMPHO	Kidney
CRL-11268™	293T/17 [HEK-293T/17]	Embryonic kidney
CRL-11268G-1™	OAT1 HEK 293T/17	Embryonic kidney stably overexpresses OAT1
HTB-44™	A-498	Kidney carcinoma
HTB-46™	Caki-1	Kidney; derived from metastatic site: skin

TABLE 6. Primary Renal Cells with Optimized Growth Media and Supplements

ATCC® No.	Designation	Growth kit	Basal medium
PCS-400-010™	Renal Proximal Tubule Epithelial Cells	Renal Epithelial Cell Growth Kit (ATCC® PCS-400-040™)	Renal Epithelial Cell Basal Medium (ATCC® PCS-400-030™)
PCS-400-011™	Renal Cortical Epithelial Cells		
PCS-400-012™	Renal Mixed Epithelial Cells		

TABLE 7. hTERT-Immortalized Primary Renal Cells, Genetically Modified Models, and Optimized Media and Growth Supplement

ATCC® No.	Designation	Growth kit	Basal medium
CRL-4031™	RPTEC/TERT1	DMEM: F-12 Medium (ATCC® 30-2006™)	hTERT-immortalized RPTEC Growth Kit (ATCC® ACS-4007™)
CRL-4031-OAT1™	RPTEC/TERT1 OAT1		
CRL-4031-OCT2™	RPTEC/TERT1 OCT2		
CRL-4031-OAT3™	RPTEC/TERT1 OAT3		

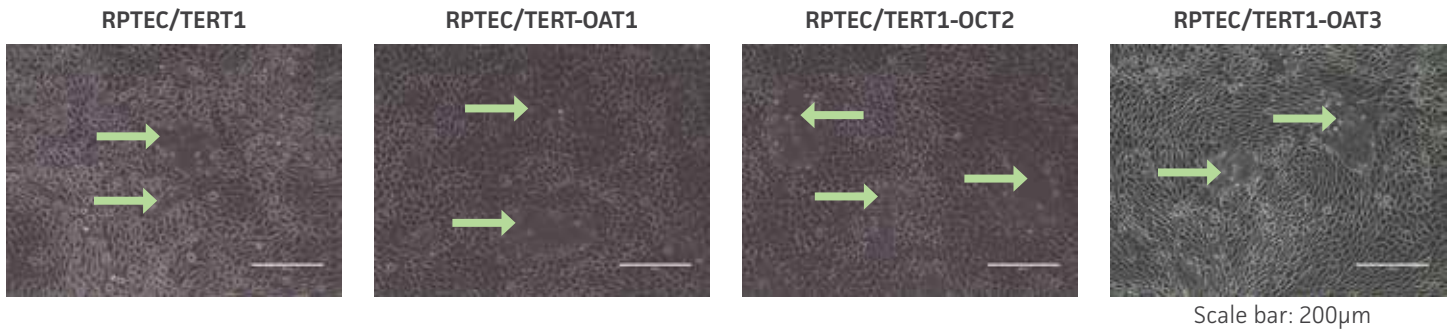


FIGURE 2. Kidney transporter over-expressing cell lines as compared to parental RPTEC/TERT1 cell lines. RPTEC/TERT1 SLC transporter cells were subjected to dome formation assay. Epithelial barrier formation is not compromised in OAT1-, OCT2-, and OAT3-expressing cell lines, as demonstrated by the formation of dome-like structures (arrows) caused by solute transport across an intact epithelial barrier.

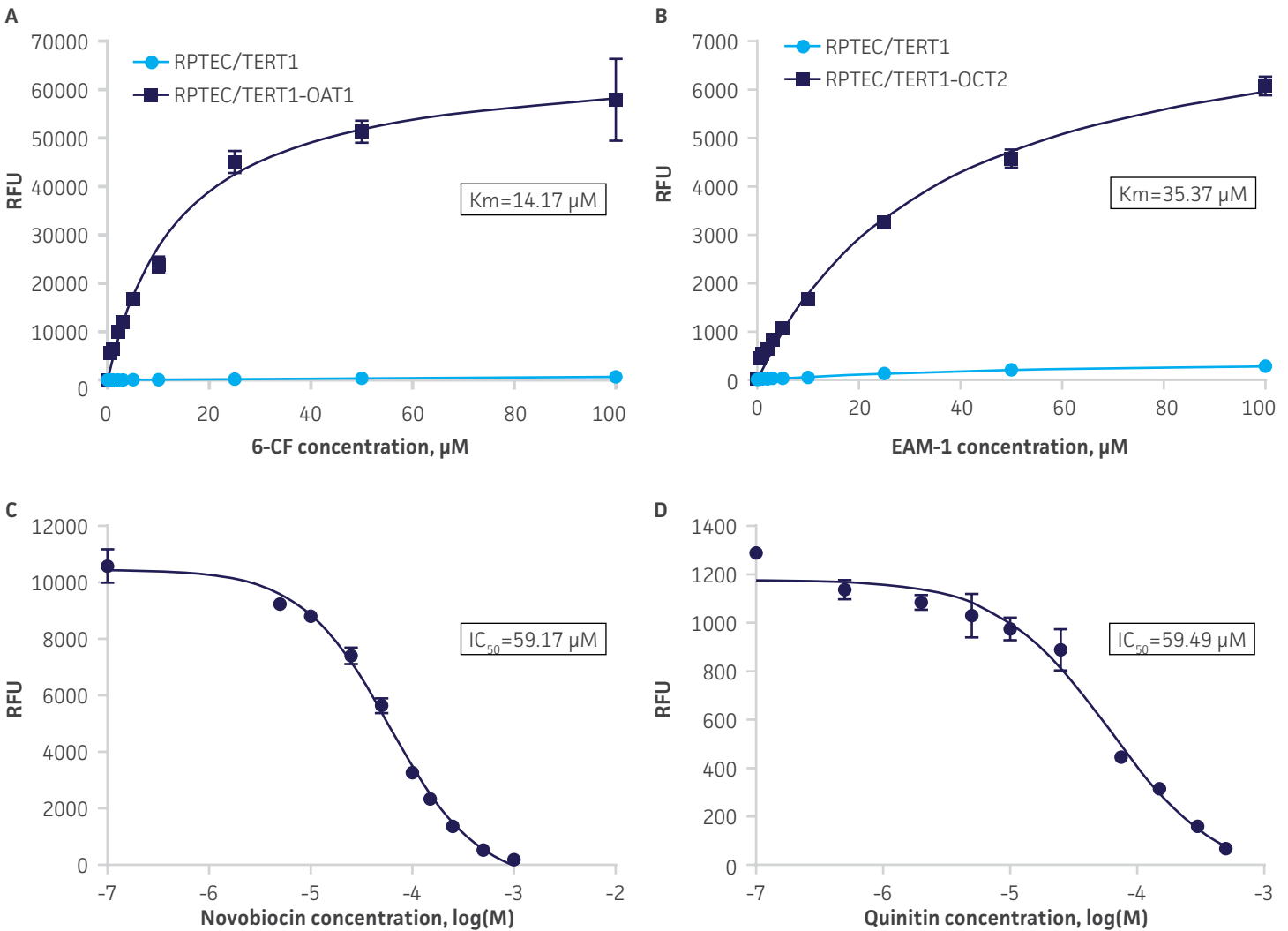


FIGURE 3. Drug kinetic profiles of RPTEC/TERT1-OAT1 and RPTEC/TERT1-OCT2 transporter cells. (A) Solute uptake activity of RPTEC/TERT1-OAT1 cells was assessed using 6-CF as a substrate. 6-CF uptake increases with increasing 6-CF concentration in OAT1-expressing cells but not in parental RPTEC/TERT1 cells ($n=3$), indicating that the observed transport is due to OAT1 expression. (B) Solute uptake activity of RPTEC/TERT1-OCT2 cells was assessed by using EAM-1 as substrate. EAM-1 uptake increases with increasing amounts of EAM-1 in OCT2-expressing cells but not in parental RPTEC/TERT1 cells ($n=3$), indicating that the observed solute transport is due to OCT2 expression. (C) OAT1-expressing cells were exposed to increasing concentrations of the known OAT1 inhibitor novobiocin while 6-CF concentration and uptake time were held constant at $3 \mu\text{M}$ and 20 minutes ($n=3$). (D) OCT2-expressing cells were exposed to increasing concentrations of the known OCT2 inhibitor quinitin while EAM-1 concentration and uptake time were held constant at $5 \mu\text{M}$ and 20 minutes ($n=3$). The resulting inhibition curves indicate that OAT1 and OCT2 have physiologically relevant transport activity when overexpressed in RPTEC/TERT1 cells.

Neurotoxicity

Cells of the nervous system are well-specialized and rarely undergo mitosis once differentiated. ATCC offers many cell lines derived from neural tissues and neural progenitor cells that can be easily differentiated into those needed for neurotoxicity studied. Work with differentiating or terminally differentiated neurons, astrocytes, and oligodendrocytes sooner--yield experimental results faster.

TABLE 8. Human and Animal Neural Tissue-Derived Cell Lines

ATCC® No.	Designation	Comments
ACS-1018™	BT142 mut/-	Brain; oligoastrocytoma grade III
CCL-107™	C6	Brain, glial; glioma
CRL-1721™	PC-12	Adrenal; pheochromocytoma
CRL-2266™	SH-SY5Y	Bone marrow, epithelial; neuroblastoma
CRL-2927™	LUHMES	Brain, embryonic mesencephalon
CRL-2941™	S16	Sciatic nerve, epithelial
CRL-2943™	S16Y	Sciatic nerve, schwann cell
CRL-10742™	HCN-2	Cortical neuron; encephalitis

TABLE 9. Neural Progenitor Cells with Media Supplement Kits

ATCC® No.	Designation
ACS-3003™	NPC Growth Kit
ACS-3004™	NPC Dopaminergic Differentiation Kit
ACS-5001™	NPCs derived from ATCC-DYS0530 Parkinson's Disease (ACS-1013)
ACS-5003™	NPCs derived from ATCC-BXS0117 (ACS-1031)
ACS-5004™	NPCs derived from ATCC-BYS0112 (ACS-1026)
ACS-5005™	Neural Progenitor Cells derived from XCL-1 DCX-GFP
ACS-5006™	Neural Progenitor Cells derived from XCL-1 GFAP-Nanoluc®-Halotag®
ACS-5007™	Neural Progenitor Cells derived from XCL-1 MAP2-Nanoluc®-Halotag®

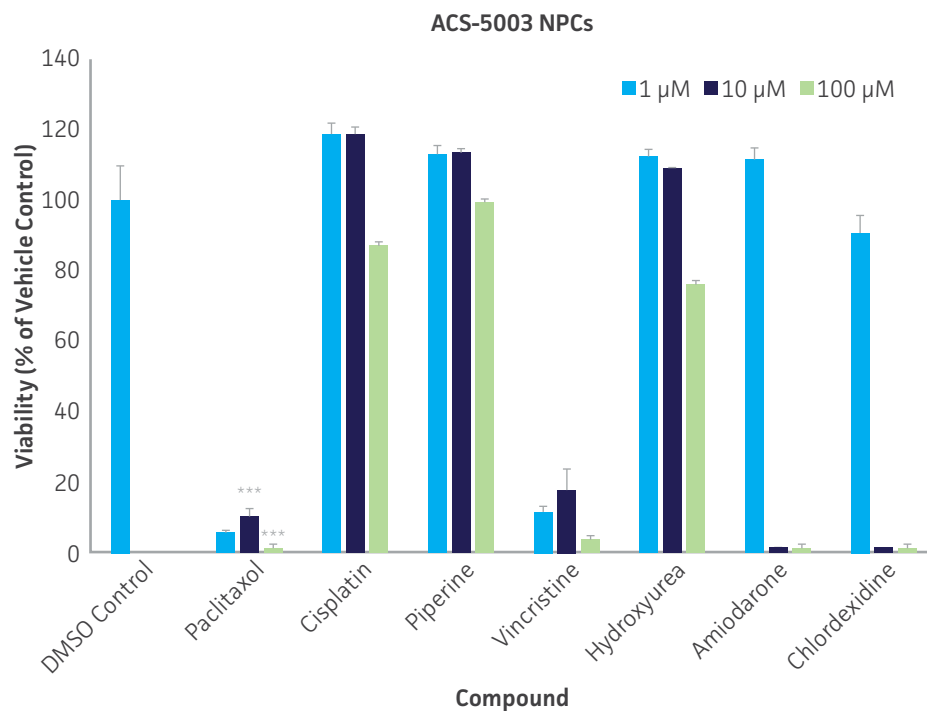


FIGURE 4. Dose response curves for cell viability of NPCs treated with paclitaxel, cisplatin, piperine, vincristine, chlorhexidine, amiodarone, and hydroxyurea for two days. Paclitaxel, vincristine, and amiodarone significantly decreased viability ($p < 0.01$) of NPCs ($n=3$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$ vs. DMSO control, Student's T-test).

Skin Corrosion, Sensitization, and Irritation Testing

ATCC offers a wide selection of cell lines, primary cells, and hTERT-immortalized cells for modeling of the skin. In addition, we supply media and supplements that support cell culture conditions in the presence or absence of serum. These products can be utilized to create 3D skin models or used in basic assays that comply with OECD standards.

Cell Type	Product Name	ATCC® No.	Growth Kit	Basal Media
Keratinocytes	Epidermal Keratinocytes; Adult	PCS-200-011™	Keratinocyte Growth Kit (ATCC® No. PCS-200-040™)	Dermal Cell Basal Medium (ATCC® No. PCS-200-030™)
	Epidermal Keratinocytes; Neonatal Foreskin	PCS-200-010™		
Melanocytes	Epidermal Melanocytes; Adult	PCS-200-013™	Melanocyte Growth Kit (ATCC® No. PCS-200-041™)	Dermal Cell Basal Medium (ATCC® No. PCS-200-030™)
	Epidermal Melanocytes; Neonatal Foreskin	PCS-200-012™	Adult Melanocyte Growth Kit (ATCC® No. PCS-200-042™)	
Fibroblasts	Dermal Fibroblasts; Adult	PCS-201-012™	Fibroblast Growth Kit, Serum-free (ATCC® No. PCS-201-040™) or Fibroblast Growth Kit, Low Serum (ATCC® No. PCS-201-041™)	Fibroblast Basal Medium (ATCC® No. PCS-201-030™)
	Dermal Fibroblasts; Neonatal	PCS-201-010™		
	Dermal Fibroblasts; Neonatal, Mitomicin C-treated	PCS-201-011™		

TABLE 10. hTERT-Immortalized Primary Cells

ATCC® No.	Designation	Tissue	Disease State
CRL-4001™	BJ-5ta	Foreskin, fibroblast	normal
CRL-4005™	TelCOFS02MA	Skin, fibroblast	cerebro-oculo-facio-skeletal syndrome
CRL-4048™	Ker-CT	Foreskin, keratinocyte	normal
CRL-4059™	hTERT-immortalized Dermal Melanocyte	Skin, female	normal

TABLE 11. Human Cell Lines

ATCC® No.	Designation	Species	Cell Type and Disease State
CRL-1872™	A375.S2	<i>Homo sapiens</i>	malignant melanoma
CRL-2309™	CCD 1106 KERTr	<i>Homo sapiens</i>	keratinocyte
CRL-2310™	CCD 1102 KERTr	<i>Homo sapiens</i>	keratinocyte; human papillomavirus 16
CRL-2404™	HEK001	<i>Homo sapiens</i>	keratinocyte
CRL-2500™	A7 [M2A7]	<i>Homo sapiens</i>	melanoma
CRL-3232™	VMM917	<i>Homo sapiens</i>	melanoma, Stage IV; malignant
CRL-9446™	CHL-1	<i>Homo sapiens</i>	melanoma
HTB-72™	SK-MEL-28	<i>Homo sapiens</i>	malignant melanoma

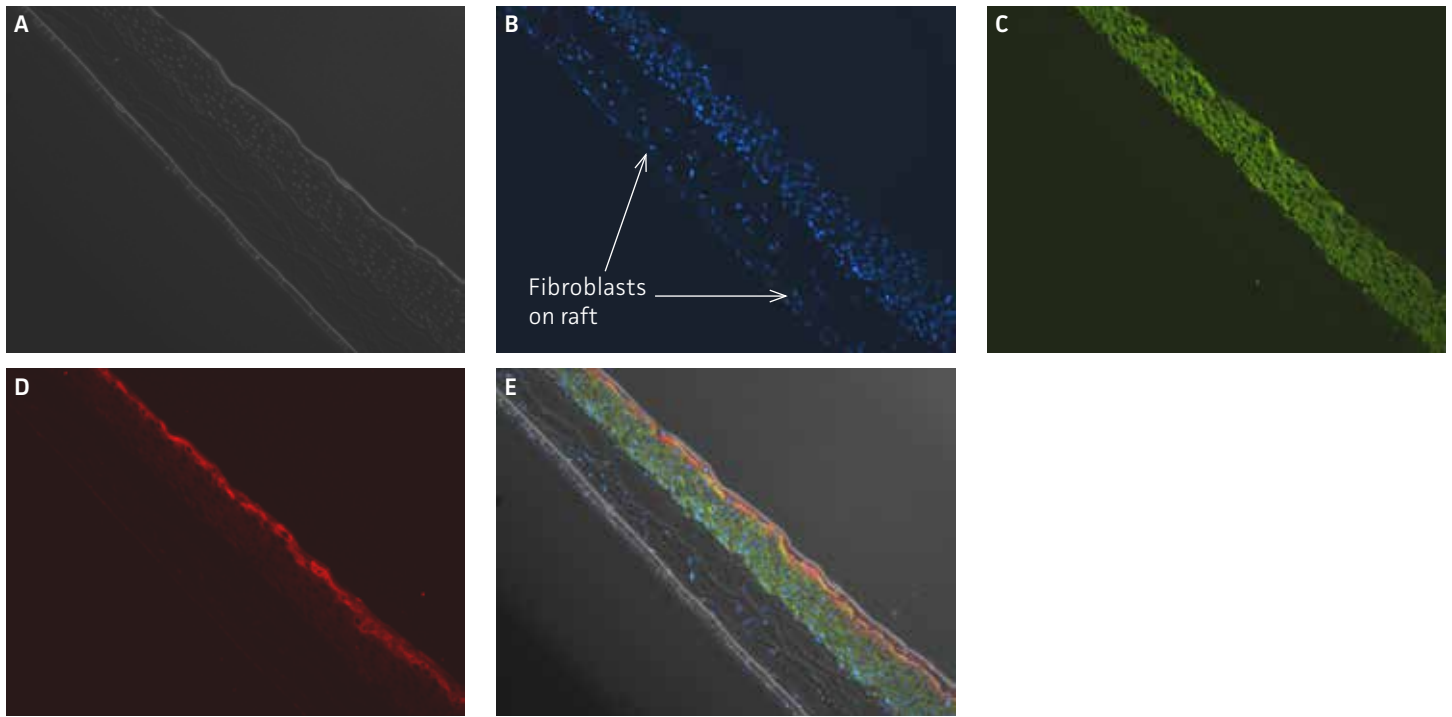


FIGURE 5. Micrograph of hTERT-immortalized Primary Keratinocytes (Ker-CT) at 11 days post airlift. A) Phase contrast micrograph at 10x magnification. Panels B-E show keratinocytes stained with (B) DAPI, (C) anti-KRT14 antibodies, (D) anti-filaggrin antibodies, or (E) an overlay.

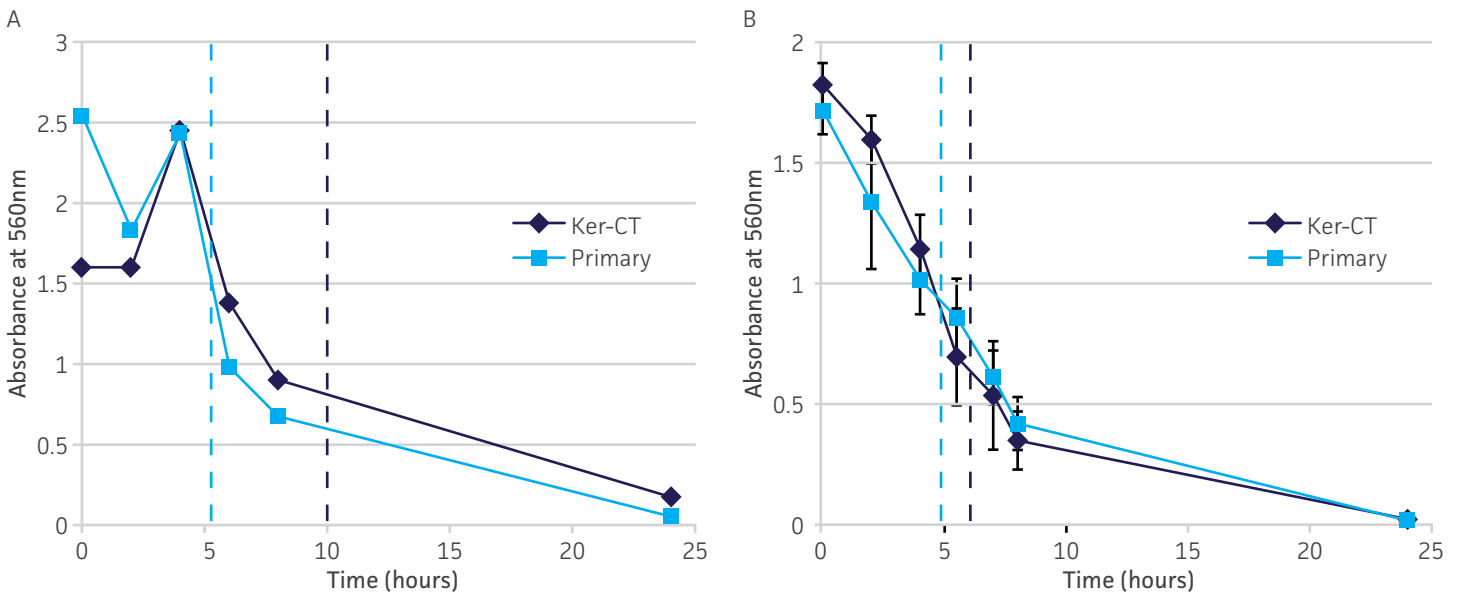


FIGURE 6. Treatment of skin models with 1% Triton X-100 to test the ability of these models to resist penetration. Ker-CT or primary keratinocytes with (A) collagen raft and (B) without collagen raft were treated with 1% Triton™ X-100 (Dow) at different durations. Viability was measured with MTT (ATCC® No. 30-1010K™). Dashed lines indicate the IC50, which are within the Organization for Economic Co-operation Development (OECD) guidelines of 4-10 hours for functional human skin models.

Genotoxicity

In vitro genotoxicity testing is made easy with ATCC materials. We offer the cells and bacteria you need for OECD-validated assays such as the bacterial reverse mutation test (Ames test), the *in vitro* mammalian chromosomal aberration test, and the *in vitro* mammalian cell micronucleus test.

TABLE 12. Human and Animal Cell Lines

ATCC® No.	Designation	Species	Comments
CCL-61™	CHO-K1	<i>Cricetulus griseus</i>	epithelial-like ovary cell line
CCL-93™	V79-4	<i>Cricetulus griseus</i>	lung, fibroblast
CRL-1935™	CHL/IU [CHL-11]	<i>Cricetulus griseus</i>	lung, fibroblast, female, newborn
CRL-8015™	TK6	<i>Homo sapiens</i>	lymphoblast
CRL-9518™	L5178Y TK+/- Clone (3.7.2C)	<i>Mus musculus</i>	lymphoblast; lymphoma

TABLE 13. Bacteria

ATCC® No.	Species	Designation
BAA-2720™	<i>Salmonella enterica</i> subsp. <i>enterica</i> serovar <i>Typhimurium</i>	LT2 TA98
BAA-2721™	<i>Salmonella enterica</i> subsp. <i>enterica</i> serovar <i>Typhimurium</i>	LT2 TA100
BAA-2722™	<i>Salmonella enterica</i> subsp. <i>enterica</i> serovar <i>Typhimurium</i>	LT2 TA102
29629™	<i>Salmonella enterica</i> subsp. <i>enterica</i> serovar <i>Typhimurium</i>	TA1535
29630™	<i>Salmonella enterica</i> subsp. <i>enterica</i> serovar <i>Typhimurium</i>	TA1537
49979™	<i>Escherichia coli</i>	WP2 uvrA

Respiratory Toxicity

ATCC® offers primary airway epithelial cells, smooth muscle cells (SMCs), and fibroblasts, as well as growth media and media supplements for *in vitro* models to boost the scientific relevance of upper respiratory studies. Our materials make it simple to test for tissue variability, cytotoxicity, and more.

TABLE 14. Human Primary Airway Cells; Normal

ATCC® No.	Designation	Growth kit	Basal medium
PCS-130-010™	Lung Smooth Muscle Cells	Vascular Smooth Muscle Cell Growth Kit (ATCC® PCS-100-042™)	Vascular Cell Basal Medium (ATCC® PCS-100-030™)
PCS-130-011™	Bronchial/Tracheal Smooth Muscle Cells		
PCS-201-013™	Lung Fibroblasts	Fibroblast Growth Kit, Low Serum (ATCC® PCS-201-041™)	Fibroblast Basal Medium (ATCC® PCS-201-030™)
PCS-301-010™	Small Airway Epithelial Cells	Bronchial Epithelial Cell Growth kit (ATCC® PCS-300-040™)	Airway Epithelial Cell Basal Medium (ATCC® PCS-300-030™)
PCS-300-010™	Bronchial/Tracheal Epithelial Cells		
PCS-300-015™	Primary Lobar Epithelial Cells		

TABLE 15. Human Primary Airway Cells; Disease

ATCC® No.	Designation	Growth kit	Basal medium
PCS-201-015™	Lung Fibroblasts; Asthma	Fibroblast Growth Kit, Low Serum (ATCC® PCS-201-041™)	Fibroblast Basal Medium (ATCC® PCS-201-030™)
PCS-201-016™	Lung Fibroblasts; Cystic Fibrosis		
PCS-201-017™	Lung Fibroblasts; COPD		
PCS-201-020™	Lung Fibroblast; Fibrosis		
PCS-300-011™	Bronchial/Tracheal Epithelial Cells; Asthma	Bronchial Epithelial Cell Growth kit (ATCC® PCS-300-040™)	Airway Epithelial Cell Basal Medium (ATCC® PCS-300-030™)
PCS-300-013™	Bronchial/Tracheal Epithelial Cells; COPD		
PCS-300-014™	Bronchial/Tracheal Epithelial Cells; Fibrosis		
PCS-301-011™	Small Airway Epithelial Cells; Asthma		
PCS-301-013™	Small Airway Epithelial Cells; COPD		
PCS-301-014™	Small Airway Epithelial Cells; Fibrosis		

TABLE 16. hTERT-Immortalized Primary Airway Cells

ATCC® No.	Designation	Comments
CRL-4011™	NuLi-1	Lung, epithelium; normal
CRL-4013™	CuFi-1	Lung, epithelial; cystic fibrosis
CRL-4015™	CuFi-4	Lung, bronchial; cystic fibrosis
CRL-4016™	CuFi-5	Lung, epithelial; cystic fibrosis
CRL-4017™	CuFi-6	Lung, bronchial; cystic fibrosis
CRL-4050™	HSAEC1-KT	Lung, small airway; normal
CRL-4051™	HBEC3-KT	Lung, bronchial; normal

TABLE 17. Human Cell Lines

ATCC® No.	Designation	Comments
CCL-153™	HFL1	Lung
CCL-185™	A549	Lung
CRL-1848™	NCI-H292	Lung, mucoepidermoid pulmonary carcinoma
CRL-5826™	NCI-H226	Lung, squamous cell carcinoma, mesothelioma
CRL-9609™	BEAS-2B	Lung, bronchial
HTB-55™	Calu-3	Lung, epithelial, adenocarcinoma
HTB-174™	NCI-H441	Lung, papillary adenocarcinoma

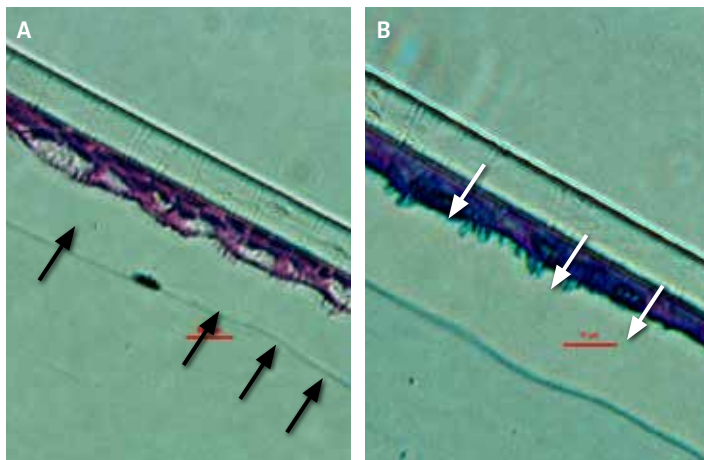


FIGURE 7. Primary HBECs form differentiated airway epithelial structures in an air-liquid interface cell culture model. Primary bronchial/tracheal epithelial cells at 28 days post airlift, and then stained with A) H&E, indicating cilia (black arrows) and goblet cells. B) Cross sections of the cells reveal PAS/Alcian blue stained-vesicles (white arrows), which suggest mucus synthesis. These results have also been observed in primary small airway cells.

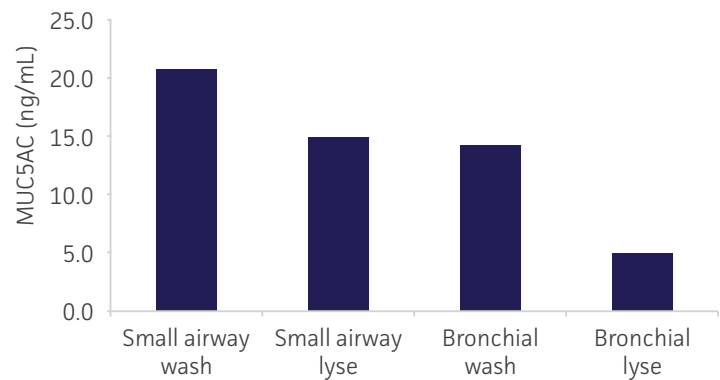


FIGURE 8. Differentiated primary respiratory epithelial cells secrete mucus. Small airway and bronchial/tracheal epithelial cells were grown in airlift 3D culture as in Figure 7. MUC5AC (an indicator of mucus secretion) was monitored via ELISA from the supernatant after a PBS wash or from the lysate of the cells. The observed expression and secretion of MUC5AC, coupled with the airway-type structures seen in Figure 7 suggests that primary airway cells can be used as an *in vitro* model of the respiratory lining.

Immunotoxicity

Immunotoxicity testing is a vital step to ensure the safety of a product, especially for medical devices. New *in vitro* methods can help identify immunosuppressants and immunostimulants as well as hypersensitivity and autoimmunity before you spend valuable time and resources on *in vivo* methods. ATCC offers high-quality cells that can be used for immunotoxicity tests.

TABLE 18. Human Cell Lines

ATCC® No.	Designation	Species	Cell Type and Disease State
CCL-246™	KG-1	<i>Homo sapiens</i>	Macrophage; acute myelogenous leukemia
CRL-1593.2™	U-937	<i>Homo sapiens</i>	Monocyte; histiocytic lymphoma
CRL-2407™	NK-92	<i>Homo sapiens</i>	Natural killer cell; malignant non-Hodgkin's lymphoma
TIB-71™	RAW 264.7	<i>Mus musculus</i>	Macrophage; Abelson murine leukemia virus-induced tumor
TIB-202™	THP-1	<i>Homo sapiens</i>	Monocyte; acute monocytic leukemia

TABLE 19. Human Primary Immune Cells

ATCC® No.	Designation	Availability
ACS-7010™	iPSC-derived Mesenchymal Stem Cells, BYS0112	Coming soon
ACS-7020™	iPSC-derived CD34+ Cells, BXS0117	Available
ACS-7030™	iPSC-derived Monocytes, DYS0100	Coming soon
PCS-800-010™	Peripheral Blood CD14+ Monocytes	Available
PCS-800-011™	Peripheral Blood Mononuclear Cells	Available
PCS-800-012™	Bone Marrow CD34+ Cells	Available
PCS-800-013™	Bone Marrow Mononuclear Cells	Available
PCS-800-014™	Cord Blood CD34+ Cells	Available
PCS-800-016™	Peripheral Blood CD4+ Helper T Cells	Available
PCS-800-017™	Peripheral Blood CD8+ Cytotoxic T Cells	Available
PCS-800-018™	Peripheral Blood CD19+ B Cells	Available
PCS-800-019™	Peripheral Blood CD56+ Natural Killer Cells	Available


Custom Services

Having trouble finding exactly what you need? Your unique problems deserve custom solutions. ATCC will work with you to develop, manufacture, preserve, and store the cells and biomaterial your research requires. We offer:

- Cell and microbial biobanking
- Custom biorepository services (both cGMP and non-cGMP)
- Custom cell development and sourcing (including primary cells from certain species or donor demographics)
- Cell authentication and mycoplasma testing


Make ATCC your trusted partner for *in vitro* toxicology testing. We are available to support every step of your workflow.

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