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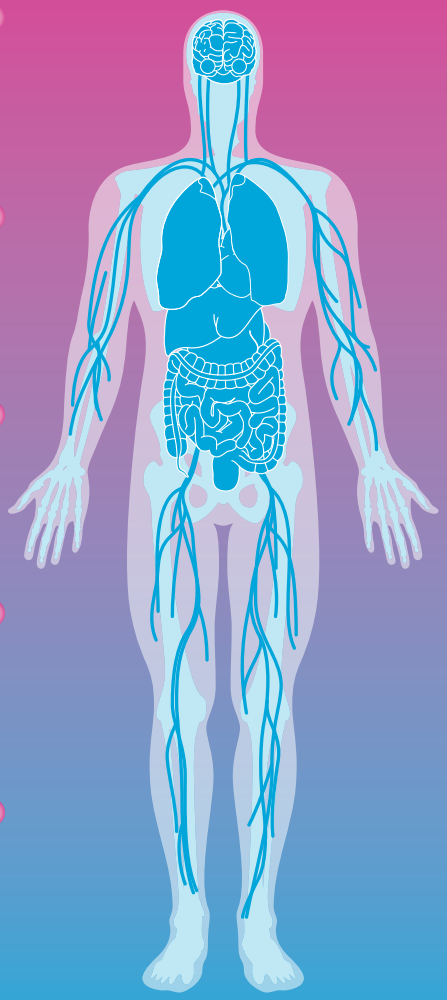
Emulate Community Publications Digest

Summer 2024 Issue



Respiratory System
Alveolus
Airway

Central Nervous System
Brain
Blood-Brain Barrier

Musculoskeletal
Bone
Synovium

Cardiovascular System
Heart
Blood

Cancer Models
Breast
Colorectal
Prostate
Barrett's Esophagus

Urinary System
Glomerulus
Kidney
Bladder

Reproductive System
Vagina
Cervix

Digestive System
Esophagus
Duodenum
Jejunum
Ileum
Colon

Lymphatic System
Bone Marrow
Lymph Node

Skin

ADME

Cancer

Cell Therapy

Gene Therapy

Immunology & Inflammation

Infectious Disease

Microbiome

Neuroscience

Toxicology

Other

Explore by Organ Model

Explore by Application

Organized by Organ Model

Cancer Models

Organ	Application	Article	Journal	Year
Barrett's Esophagus	Cancer	Epithelial-Stromal Interactions in Barrett's Esophagus Modeled in Human Organ Chips	Gastro Hep Advances	2023
Breast and prostate cancer bone metastasis model	Cancer	A Novel Primary Cilium-Mediated Mechanism Through which Osteocytes Regulate Metastatic Behavior of Both Breast and Prostate Cancer Cells	Advanced Science	2023
Breast and prostate cancer bone metastasis model	Cancer	Mechanical Stimulation Modulates Osteocyte Regulation of Cancer Cell Phenotype	Cancers	2021
Intestine (Colorectal cancer)	Cancer	Multiplexed imaging and effluent analysis to monitor cancer cell intravasation using a colorectal cancer-on-chip	STAR Protocols	2021
Review Article	Cancer	Organ-on-a-Chip and Microfluidic Platforms for Oncology in the UK	Cancers	2023

Cardiovascular System

Organ	Application	Article	Journal	Year
Blood	Model Development	Organ-on-Chip Recapitulates Thrombosis Induced by an anti-CD154 Monoclonal Antibody: Translational Potential of Advanced Microengineered Systems	Clinical Pharmacology & Therapeutics	2018
Heart	Toxicology	Multi-lineage heart-chip models drug cardiotoxicity and enhances maturation of human stem cell-derived cardiovascular cells	Lab on a Chip	2024

Central Nervous System

Organ	Application	Article	Journal	Year
Brain	Model Development	Human iPSC-Derived Endothelial Cells and Microengineered Organ-Chip Enhance Neuronal Development	Stem Cell Reports	2018
Brain	Neuroscience	Organ-Chips Enhance the Maturation of Human iPSC-Derived Dopamine Neurons	International Journal of Molecular Science	2023
Brain	Neuroscience	Modeling alpha-synuclein pathology in a human brain-chip to assess blood-brain barrier disruption	Nature Communications	2021
Brain	Neuroscience, Immunology & Inflammation	A microengineered Brain-Chip to model neuroinflammation in humans	iScience	2022
Brain - Blood Brain Barrier	Neuroscience, ADME	Evaluation of Drug Blood-Brain-Barrier Permeability Using a Microfluidic Chip	Pharmaceutics	2024

Organized by Organ Model

Central Nervous System - Continued				
Organ	**Application**	**Article**	**Journal**	**Year**
Brain - Blood Brain Barrier	Neuroscience	Generation of a Human iPSC-Based Blood-Brain Barrier Chip	JoVE	2020
Brain - Blood Brain Barrier	Neuroscience	Human iPSC-Derived Blood-Brain Barrier Chips Enable Disease Modeling and Personalized Medicine Applications	Cell Stem Cell	2019

Digestive System				
Organ	**Application**	**Article**	**Journal**	**Year**
Esophagus	Cancer	Epithelial-Stromal Interactions in Barrett's Esophagus Modeled in Human Organ Chips	Gastro Hep Advances	2023
Intestine (Caco2 & organoids)	Cancer	Human colorectal cancer-on-chip model to study the microenvironmental influence on early metastatic spread	iScience	2021
Intestine (Caco2)	ADME	Validation of a Caco-2 microfluidic Chip model for predicting intestinal absorption of BCS Class I-IV drugs	International Journal of Pharmaceutics	2024
Intestine (Caco2)	ADME	Addressing the ADME Challenges of Compound Loss in a PDMS-Based Gut-on-Chip Microphysiological System	Pharmaceutics	2024
Intestine (Caco2)	Immunology & Inflammation	Cytokine induced inflammatory bowel disease model using organ-on-a-chip technology	PLOS ONE	2023
Intestine (Caco2)	Infectious Disease	4D live imaging and computational modeling of a functional gut-on-a-chip evaluate how peristalsis facilitates enteric pathogen invasion	Science Advances	2022
Intestine (Caco2)	Infectious Disease	Bioengineered Human Organ-on-Chip Reveals Intestinal Microenvironment and Mechanical Forces Impacting Shigella Infection	Cell Host & Microbe	2019
Intestine (Caco2)	Infectious Disease	Human Gut-On-A-Chip Supports Polarized Infection of Coxsackie B1 Virus In Vitro	PLOS ONE	2017
Intestine (Caco2)	Infectious Disease	Clostridioides difficile binary toxin CDT induces biofilm-like persisting microcolonies	bioRxiv	2024
Intestine (Caco2)	Microbiome	Characterization of an engineered live bacterial therapeutic for the treatment of phenylketonuria in a human gut-on-a-chip	Nature Communications	2021
Intestine (Caco2)	Microbiome	Effects of human milk oligosaccharides on the adult gut microbiota and barrier function	Nutrients	2020
Intestine (Caco2)	Microbiome	A complex human gut microbiome cultured in an anaerobic intestine-on-a-chip	Nature Biomedical Engineering	2018
Intestine (Caco2)	Microbiome	Human gut-on-a-chip inhabited by microbial flora that experiences intestinal peristalsis-like motions and flow	Lab on a Chip	2012

Organized by Organ Model

Digestive System - Continued				
Organ	**Application**	**Article**	**Journal**	**Year**
Intestine (Caco2)	Model Development	SCRIB controls apical contractility during epithelial differentiation	Journal of Cell Biology	2023
Intestine (Caco2), Liver	Organ-on-a-Chip Technology (Other)	Identification of pharmacological inducers of a reversible hypometabolic state for whole organ preservation	eLife	2024
Intestine (Colon and Duodenum)	Model Development	Combining Human Organoids and Organ-on-a-Chip Technology to Model Intestinal Region-Specific Functionality	JoVE	2024
Intestine (Colon and Duodenum), Lung	Toxicology, Immunology & Inflammation, Cancer	Human immunocompetent Organ-on-Chip platforms allow safety profiling of tumor-targeted T-cell bispecific antibodies	eLife	2021
Intestine (Colon mouse)	Microbiome, Infectious Disease	Harnessing Colon Chip Technology to Identify Commensal Bacteria That Promote Host Tolerance to Infection	Frontiers in Cellular and Infection Microbiology	2021
Intestine (Colon)	Immunology & Inflammation	A Novel Microphysiological Colon Platform to Decipher Mechanisms Driving Human Intestinal Permeability	Cellular and Molecular Gastroenterology and Hepatology	2021
Intestine (Colon)	Infectious Disease	Species-specific enhancement of enterohemorrhagic E. coli pathogenesis mediated by microbiome metabolites	Microbiome	2019
Intestine (Colon)	Model Development	Human Colon-on-a-Chip Enables Continuous In Vitro Analysis of Colon Mucus Layer Accumulation and Physiology	Cellular and Molecular Gastroenterology and Hepatology	2020
Intestine (Colon), Lung (Alveolus)	Immunology & Inflammation	Safety Profiling of Tumor-targeted T Cell-Bispecific Antibodies with Alveolus Lung- and Colon-on-Chip	Bio-protocol	2023
Intestine (Colorectal cancer)	Cancer	Multiplexed imaging and effluent analysis to monitor cancer cell intravasation using a colorectal cancer-on-chip	STAR Protocols	2021
Intestine (Duodenum)	ADME	Developing an adult stem cell derived microphysiological intestinal system for predicting oral prodrug bioconversion and permeability in humans	Lab on a Chip	2023
Intestine (Duodenum)	ADME	Duodenum Intestine-Chip for preclinical drug assessment in a human relevant model	eLife	2020
Intestine (Duodenum)	Immunology & Inflammation	Enhanced Utilization of Induced Pluripotent Stem Cell-Derived Human Intestinal Organoids Using Microengineered Chips	Cellular and Molecular Gastroenterology and Hepatology	2017

Organized by Organ Model

Digestive System - Continued				
Organ	**Application**	**Article**	**Journal**	**Year**
Intestine (Duodenum)	Infectious Disease	Enteric coronavirus infection and treatment modeled with an immunocompetent human intestine-on-a-chip	Frontiers in Pharmacology	2021
Intestine (Duodenum)	Model Development	Direct therapeutic effect of sulfadoxine-pyrimethamine on nutritional deficiency-induced enteric dysfunction in a human intestine chip	eBioMedicine	2023
Intestine (Duodenum)	Model Development	Establishment of physiologically relevant oxygen gradients in microfluidic organ chips	Lab on a Chip	2022
Intestine (Duodenum)	Model Development	Nutritional deficiency in an intestine-on-a-chip recapitulates injury hallmarks associated with environmental enteric dysfunction	Nature Biomedical Engineering	2022
Intestine (Ileum)	Immunology & Inflammation	Microfluidic device facilitates in vitro modeling of human neonatal necrotizing enterocolitis-on-a-chip	JCI Insight	2023
Intestine (Jejunum)	Infectious Disease	Mechanical Stimuli Affect Escherichia coli Heat-Stable Enterotoxin-Cyclic GMP Signaling in a Human Enteroid Intestine-Chip Model	Infection and Immunity	2020
Intestine (Small)	Model Development	Development of a primary human Small Intestine-on-a-Chip using biopsy-derived organoids	Scientific Reports	2018
Review Article	Toxicology	Trust your gut: Establishing confidence in gastrointestinal models - An overview of the state of the science and contexts of use	ALTEX	2024
Small Intestine	Model development	An iPSC-derived small intestine-on-chip with self-organizing epithelial, mesenchymal and neural cells	bioRxiv	2024
Small Intestine, Colon, Cervix, Vagina, Lung (Airway)	Model development	Modeling mucus physiology and pathophysiology in human organs-on-chips	Advanced Drug Delivery Reviews	2022

Liver				
Organ	**Application**	**Article**	**Journal**	**Year**
Liver	ADME	Phenotypic Characterization of Liver Sinusoidal Endothelial Cells on the Human Liver-Chip for Potential in vitro Therapeutic Antibody Pharmacology Applications	bioRxiv	2022
Liver	ADME, Toxicology	Integrated in vitro models for hepatic safety and metabolism: evaluation of a human Liver-Chip and liver spheroid	Archives of Toxicology	2019
Liver	Immunology & Inflammation	Organ-on-a-chip for studying immune cell adhesion to liver sinusoidal endothelial cells: the potential for testing immunotherapies and cell therapy trafficking	Archives of Toxicology	2024
Liver	Immunology & Inflammation	Modeling alcohol-associated liver disease in a human Liver-Chip	Cell Reports	2021
Liver	Toxicology	Beyond the Hype and Towards Application: Liver Complex In Vitro Models in Preclinical Drug Safety	Expert Opinion on Drug Metabolism & Toxicology	2024

Organized by Organ Model

Liver - Continued				
Organ	**Application**	**Article**	**Journal**	**Year**
Liver	Toxicology	A human liver organoid screening platform for DILI risk prediction	Journal of Hepatology	2023
Liver	Toxicology	A novel approach to interrogating the effects of chemical warfare agent exposure using organ-on-a-chip technology and multiomic analysis	PLOS ONE	2023
Liver	Toxicology	Performance assessment and economic analysis of a human Liver-Chip for predictive toxicology	Communications Medicine	2023
Liver	Toxicology	Co-Culture of Human Primary Hepatocytes and Nonparenchymal Liver Cells in the Emulate® Liver-Chip for the Study of Drug-Induced Liver Injury	Current Protocols	2022
Liver	Toxicology	Utilization of a model hepatotoxic compound, diglycolic acid, to evaluate liver Organ-Chip performance and in vitro to in vivo concordance	Food and Chemical Toxicology	2020
Liver (Human, dog, rat)	Toxicology	Reproducing human and cross-species drug toxicities using a Liver-Chip	Science Translational Medicine	2019
Liver, Intestine (Caco2)	Organ-on-a-Chip Technology (Other)	Identification of pharmacological inducers of a reversible hypometabolic state for whole organ preservation	eLife	2024

Lymphatic System				
Organ	**Application**	**Article**	**Journal**	**Year**
Bone Marrow	Toxicology	On-chip recapitulation of clinical bone marrow toxicities and patient-specific pathophysiology	Nature Biomedical Engineering	2020
Bone Marrow (mouse)	Model Development	Bone Marrow Microenvironment-On-Chip for Culture of Functional Hematopoietic Stem Cells	Frontiers in Bioengineering and Biotechnology	2022
Lymph Node	Immunology & Inflammation	Recapitulating memory B cell responses in a Lymphoid Organ-Chip to evaluate mRNA vaccine boosting strategies	bioRxiv	2024
Lymph Node	Immunology & Inflammation	Ectopic Lymphoid Follicle Formation and Human Seasonal Influenza Vaccination Responses Recapitulated in an Organ-on-a-Chip	Advanced Science	2022
Lymph Node	Infectious Disease	DNA origami vaccine (DoriVac) nanoparticles improve both humoral and cellular immune responses to infectious diseases	bioRxiv	2024

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Musculoskeletal System				
Organ	**Application**	**Article**	**Journal**	**Year**
Bone	Model Development	Bone Chip System to Monitor Osteogenic Differentiation Using Optical Imaging	Microfluidics and Nanofluidics	2019
Breast and prostate cancer bone metastasis model	Cancer	A Novel Primary Cilium-Mediated Mechanism Through which Osteocytes Regulate Metastatic Behavior of Both Breast and Prostate Cancer Cells	Advanced Science	2023
Breast and prostate cancer bone metastasis model	Cancer	Mechanical Stimulation Modulates Osteocyte Regulation of Cancer Cell Phenotype	Cancers	2021
Synovium	Immunology & Inflammation	Human vascularised synovium-on-a-chip: a mechanically stimulated, microfluidic model to investigate synovial inflammation and monocyte recruitment	Biomedical Matererials	2023

Reproductive System				
Organ	**Application**	**Article**	**Journal**	**Year**
Cervix	Microbiome	Mucus production, host-microbiome interactions, hormone sensitivity, and innate immune responses modeled in human cervix chips	Nature	2024
Vagina	Microbiome	Modeling Healthy and Dysbiotic Vaginal Microenvironments in a Human Vagina-on-a-Chip	JoVE	2024
Vagina	Microbiome	Vaginal microbiome-host interactions modeled in a human vagina-on-a-chip	Microbiome	2022
Vagina, Cervix	Microbiome	Modulation of dysbiotic vaginal complications by cervical mucus revealed in linked human vagina and cervix chips	bioRxiv	2023
Vagina, Cervix, Small Intestine, Colon, Lung (Airway)	Organ-on-a-Chip Technology (Other)	Modeling mucus physiology and pathophysiology in human organs-on-chips	Advanced Drug Delivery Reviews	2022

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Respiratory System				
Organ	**Application**	**Article**	**Journal**	**Year**
Lung	ADME	Simulating drug concentrations in PDMS microfluidic organ chips	Lab on a Chip	2021
Lung (Airway)	Immunology & Inflammation	Modeling pulmonary cystic fibrosis in a human lung airway-on-a-chip	Journal of Cystic Fibrosis	2021
Lung (Airway)	Infectious Disease	Clinically Relevant Influenza Virus Evolution Reconstituted in a Human Lung Airway-on-a-Chip	Microbiology Spectrum	2021
Lung (Airway)	Infectious Disease	A human-airway-on-a-chip for the rapid identification of candidate antiviral therapeutics and prophylactics	Nature Biomedical Engineering	2021
Lung (Airway)	Infectious Disease	A Microengineered Airway Lung Chip Models Key Features of Viral-induced Exacerbation of Asthma	American Journal of Respiratory Cell and Molecular Biology	2020
Lung (Airway)	Model Development	Breathing on Chip: Biomechanical forces change airway epithelial cell biology in a human Airway Lung-Chip	Materials Today Bio	2023
Lung (Alveolus)	Immunology & Inflammation	Dissolved gases from pressure changes in the lungs elicit an immune response in human peripheral blood	Bioengineering & Translational Medicine	2024
Lung (Alveolus and Airway)	Immunology & Inflammation	Self-assembling short immunostimulatory duplex RNAs with broad-spectrum antiviral activity	Molecular Therapy Nucleic Acids	2022
Lung (Alveolus)	Gene Therapy	AAV-mediated gene therapy targeting TRPV4 mechanotransduction for inhibition of pulmonary vascular leakage	APL Bioengineering	2019
Lung (Alveolus)	Infectious Disease	Modelling SARS-CoV-2 infection in a human alveolus microphysiological system	Access Microbiology	2024
Lung (Alveolus)	Infectious Disease	Mechanopathology of biofilm-like Mycobacterium tuberculosis cords	Cell	2023
Lung (Alveolus)	Infectious Disease	Mechanical control of innate immune responses against viral infection revealed in a human Lung Alveolus Chip	Nature Communications	2022
Lung (Alveolus)	Infectious Disease	The cGAS-STING pathway drives type I IFN immunopathology in COVID-19	Nature	2022
Lung (Alveolus)	Infectious Disease	Rapid endotheliitis and vascular damage characterize SARS-CoV-2 infection in a human lung-on-chip model	EMBO reports	2021
Lung (Alveolus)	Infectious Disease	A lung-on-chip model of early Mycobacterium tuberculosis infection reveals an essential role for alveolar epithelial cells in controlling bacterial growth	eLife	2020

Organized by Organ Model

Respiratory System - Continued				
Organ	**Application**	**Article**	**Journal**	**Year**
Lung (Alveolus)	Model Development	Organoid-based expansion of patient-derived primary alveolar type 2 cells for establishment of alveolus epithelial Lung-Chip cultures	American Journey of Physiology Lung Cellular and Molecular Physiology	2022
Lung (Alveolus)	Toxicology	A human lung alveolus-on-a-chip model of acute radiation-induced lung injury	Nature Communications	2023
Lung (Alveolus)	Toxicology, Immunology & Inflammation	Reconstituting Organ-Level Lung Functions on a Chip	Science	2010
Lung (Alveolus), Intestine (Colon)	Immunology & Inflammation	Safety Profiling of Tumor-targeted T Cell-Bispecific Antibodies with Alveolus Lung- and Colon-on-Chip	Bio-protocol	2023
Lung (Alveolus), Skin	Model Development, Cancer	Reconstituting Cytoarchitecture and Function of Human Epithelial Tissues on an Open-Top Organ-Chip	JoVE	2023
Lung (Alveolus), Skin	Model Development, Cancer	A novel Organ-Chip system emulates three-dimensional architecture of the human epithelia and allows fine control of mechanical forces acting on it.	Biomaterials	2021
Lung (Bovine)	Infectious Disease	Development and evaluation of a bovine lung-on-chip (bLOC) to study bovine respiratory diseases	In vitro models	2022
Lung, Intestine (Colon & Duodenum)	Toxicology, Immunology & Inflammation, Cancer	Human immunocompetent Organ-on-Chip platforms allow safety profiling of tumor-targeted T-cell bispecific antibodies	eLife	2021

Skin				
Organ	**Application**	**Article**	**Journal**	**Year**
Skin, Lung (Alveolus)	Model Development	Reconstituting Cytoarchitecture and Function of Human Epithelial Tissues on an Open-Top Organ-Chip	JoVE	2023
Skin, Lung (Alveolus)	Model Development, Cancer	A novel Organ-Chip system emulates three-dimensional architecture of the human epithelia and allows fine control of mechanical forces acting on it.	Biomaterials	2021

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Urinary System				
Organ	**Application**	**Article**	**Journal**	**Year**
Bladder	Infectious Disease	Dynamic persistence of UPEC intracellular bacterial communities in a human bladder-chip model of urinary tract infection	eLife	2021
Kidney (Glomerulus)	Model Development	An ultrathin membrane mediates tissue-specific morphogenesis and barrier function in a human kidney chip	Science Advances	2024
Kidney (Glomerulus)	Model Development	Physiological Replication of the Human Glomerulus Using a Triple Culture Microphysiological System	Advanced Science	2023
Kidney (Glomerulus)	Model Development	Directed differentiation of human induced pluripotent stem cells into mature kidney podocytes and establishment of a Glomerulus Chip.	Nature Protocols	2018
Kidney (Glomerulus)	Toxicology	A Personalized Glomerulus Chip Engineered from Stem Cell-Derived Epithelium and Vascular Endothelium	Micromachines	2021
Kidney (Glomerulus)	Toxicology	Mature induced-pluripotent-stem-cell-derived human podocytes reconstitute kidney glomerular-capillary-wall function on a chip	Nature Biomedical Engineering	2017
Kidney (Glomerulus, mouse)	Model Development	REST and Stress Resistance in the Ageing Kidney	Journal of the American Society of Nephrology	2021
Kidney (Proximal Tubule)	ADME	Assessment of Human Renal Transporter Based Drug-Drug Interactions Using Proximal Tubule Kidney-Chip	bioRxiv	2022
Kidney (Proximal Tubule)	ADME, Toxicology	Human kidney proximal tubule-on-a-chip for drug transport and nephrotoxicity assessment	Integrative Biology	2013
Kidney (Proximal Tubule)	Immunology & Inflammation	Circulating extracellular vesicles in human cardiorenal syndrome promote renal injury in Kidney on Chip system	JCI Insight	2023

Technology				
Subject	**Application**	**Article**	**Journal**	**Year**
Bioinformations	Organ-on-a-Chip Technology (Other)	An Information-Theoretic Approach for Measuring the Distance of Organ Tissue Samples Using Their Transcriptomic Signatures	Bioinformatics	2020
Imaging Analysis	Organ-on-a-Chip Technology (Other)	Introducing an automated high content confocal imaging approach for Organs-on-Chips	Lab on a Chip	2019
Review Article	Organ-on-a-Chip Technology (Other)	Human organs-on-chips for disease modelling, drug development and personalized medicine	Nature Reviews Genetics	2022
Review Article	Organ-on-a-Chip Technology (Other)	Opportunities and challenges with microphysiological systems: a pharma end-user perspective	Nature Reviews Drug Discovery	2020

Organized by Organ Model

Technology - Continued				
Subject	**Application**	**Article**	**Journal**	**Year**
Review Article	Organ-on-a-Chip Technology (Other)	Organs-on-Chips in Clinical Pharmacology: Putting the Patient Into the Center of Treatment Selection and Drug Development	Clinical Pharmacology & Therapeutics	2019
Review Article	Toxicology	The Future of Uncertainty Factors With In Vitro Studies Using Human Cells	Toxicological Sciences	2022
Review Article	Toxicology	Application of Microphysiological Systems to Enhance Safety Assessment in Drug Discovery	Annual Review of Pharmacology and Toxicology	2018
Review Article	Toxicology	Optimizing Drug Discovery by Investigative Toxicology: Current and Future Trends	ALTEX	2018

Organized by Application

ADME

Organ	Article	Journal	Year
Brain - Blood Brain Barrier	Evaluation of Drug Blood-Brain-Barrier Permeability Using a Microfluidic Chip	Pharmaceutics	2024
Intestine (Caco2)	Validation of a Caco-2 microfluidic Chip model for predicting intestinal absorption of BCS Class I-IV drugs	International Journal of Pharmaceutics	2024
Intestine (Caco2)	Addressing the ADME Challenges of Compound Loss in a PDMS-Based Gut-on-Chip Microphysiological System	Pharmaceutics	2024
Intestine (Duodenum)	Developing an adult stem cell derived microphysiological intestinal system for predicting oral prodrug bioconversion and permeability in humans	Lab on a Chip	2023
Intestine (Duodenum)	Duodenum Intestine-Chip for preclinical drug assessment in a human relevant model	eLife	2020
Kidney (Proximal Tubule)	Assessment of Human Renal Transporter Based Drug-Drug Interactions Using Proximal Tubule Kidney-Chip	bioRxiv	2022
Kidney (Proximal Tubule)	Human kidney proximal tubule-on-a-chip for drug transport and nephrotoxicity assessment	Integrative Biology	2013
Liver	Phenotypic Characterization of Liver Sinusoidal Endothelial Cells on the Human Liver-Chip for Potential in vitro Therapeutic Antibody Pharmacology Applications	bioRxiv	2022
Liver	Integrated in vitro models for hepatic safety and metabolism: evaluation of a human Liver-Chip and liver spheroid	Archives of Toxicology	2019
Lung	Simulating drug concentrations in PDMS microfluidic organ chips	Lab on a Chip	2021

Cancer

Organ	Article	Journal	Year
Breast and prostate cancer bone metastasis model	A Novel Primary Cilium-Mediated Mechanism Through which Osteocytes Regulate Metastatic Behavior of Both Breast and Prostate Cancer Cells	Advanced Science	2023
Breast and prostate cancer bone metastasis model	Mechanical Stimulation Modulates Osteocyte Regulation of Cancer Cell Phenotype	Cancers	2021
Esophagus	Epithelial-Stromal Interactions in Barrett's Esophagus Modeled in Human Organ Chips	Gastro Hep Advances	2023
Intestine (Caco2 & organoids)	Human colorectal cancer-on-chip model to study the microenvironmental influence on early metastatic spread	iScience	2021
Intestine (Colon & Duodenum); Lung	Human immunocompetent Organ-on-Chip platforms allow safety profiling of tumor-targeted T-cell bispecific antibodies	eLife	2021
Intestine (Colorectal cancer)	Multiplexed imaging and effluent analysis to monitor cancer cell intravasation using a colorectal cancer-on-chip	STAR Protocols	2021
Lung (Alveolus) and skin	A novel Organ-Chip system emulates three-dimensional architecture of the human epithelia and allows fine control of mechanical forces acting on it.	Biomaterials	2021
Review Article	Organ-on-a-Chip and Microfluidic Platforms for Oncology in the UK	Cancers	2023

Organized by Application

Gene Therapy

Organ	Article	Journal	Year
Lung (Alveolus)	AAV-mediated gene therapy targeting TRPV4 mechanotransduction for inhibition of pulmonary vascular leakage	APL Bioengineering	2019

Immunology & Inflammation

Organ	Article	Journal	Year
Brain	A microengineered Brain-Chip to model neuroinflammation in humans	iScience	2022
Intestine (Caco2)	Cytokine induced inflammatory bowel disease model using organ-on-a-chip technology	PLOS ONE	2023
Intestine (Colon)	A Novel Microphysiological Colon Platform to Decipher Mechanisms Driving Human Intestinal Permeability	Cellular and Molecular Gastroenterology and Hepatology	2021
Intestine (Colon & Duodenum); Lung	Human immunocompetent Organ-on-Chip platforms allow safety profiling of tumor-targeted T-cell bispecific antibodies	eLife	2021
Intestine (Duodenum)	Enhanced Utilization of Induced Pluripotent Stem Cell-Derived Human Intestinal	Cellular and Molecular Gastroenterology and Hepatology	2017
Intestine (Ileum)	Microfluidic device facilitates in vitro modeling of human neonatal necrotizing enterocolitis-on-a-chip	JCI Insight	2023
Kidney (Proximal Tubule)	Circulating extracellular vesicles in human cardiorenal syndrome promote renal injury in Kidney on Chip system	JCI Insight	2023
Liver	Modeling alcohol-associated liver disease in a human Liver-Chip	Cell Reports	2021
Lung (Airway)	Modeling pulmonary cystic fibrosis in a human lung airway-on-a-chip	Journal of Cystic Fibrosis	2021
Lung (Alveolus)	Dissolved gases from pressure changes in the lungs elicit an immune response in human peripheral blood	Bioengineering & Translational Medicine	2024
Lung (Alveolus)	Reconstituting Organ-Level Lung Functions on a Chip	Science	2010
Lung (Alveolus and Airway)	Self-assembling short immunostimulatory duplex RNAs with broad-spectrum antiviral activity	Molecular Therapy Nucleic Acids	2022
Lung (Alveolus) & Intestine (Colon)	Safety Profiling of Tumor-targeted T Cell-Bispecific Antibodies with Alveolus Lung- and Colon-on-Chip	Bio-protocol	2023
Lymph Node	Recapitulating memory B cell responses in a Lymphoid Organ-Chip to evaluate mRNA vaccine boosting strategies	bioRxiv	2024
Lymph Node	Ectopic Lymphoid Follicle Formation and Human Seasonal Influenza Vaccination Responses Recapitulated in an Organ-on-a-Chip	Advanced Science	2022
Synovium	Human vascularised synovium-on-a-chip: a mechanically stimulated, microfluidic model to investigate synovial inflammation and monocyte recruitment	Biomedical Matererials	2023

Organized by Application

Infectious Disease			
Organ	**Article**	**Journal**	**Year**
Bladder	Dynamic persistence of UPEC intracellular bacterial communities in a human bladder-chip model of urinary tract infection	eLife	2021
Intestine (Caco2)	Clostridioides difficile binary toxin CDT induces biofilm-like persisting microcolonies	bioRxiv	2024
Intestine (Caco2)	4D live imaging and computational modeling of a functional gut-on-a-chip evaluate how peristalsis facilitates enteric pathogen invasion	Science Advances	2022
Intestine (Caco2)	Bioengineered Human Organ-on-Chip Reveals Intestinal Microenvironment and Mechanical Forces Impacting Shigella Infection	Cell Host & Microbe	2019
Intestine (Caco2)	Human Gut-On-A-Chip Supports Polarized Infection of Coxsackie B1 Virus In Vitro	PLOS ONE	2017
Intestine (Colon)	Species-specific enhancement of enterohemorrhagic E. coli pathogenesis mediated by microbiome metabolites	Microbiome	2019
Intestine (Colon, mouse)	Harnessing Colon Chip Technology to Identify Commensal Bacteria That Promote Host Tolerance to Infection	Frontiers in Cellular and Infection Microbiology	2021
Intestine (Duodenum)	Enteric coronavirus infection and treatment modeled with an immunocompetent human intestine-on-a-chip	Frontiers in Pharmacology	2021
Intestine (Jejunum)	Mechanical Stimuli Affect Escherichia coli Heat-Stable Enterotoxin-Cyclic GMP Signaling in a Human Enteroid Intestine-Chip Model	Infection and Immunity	2020
Lung (Airway)	Clinically Relevant Influenza Virus Evolution Reconstituted in a Human Lung Airway-on-a-Chip	Microbiology Spectrum	2021
Lung (Airway)	A human-airway-on-a-chip for the rapid identification of candidate antiviral therapeutics and prophylactics	Nature Biomedical Engineering	2021
Lung (Airway)	A Microengineered Airway Lung Chip Models Key Features of Viral-induced Exacerbation of Asthma	American Journal of Respiratory Cell and Molecular Biology	2020
Lung (Alveolus)	Modelling SARS-CoV-2 infection in a human alveolus microphysiological system	Access Microbiology	2024
Lung (Alveolus)	Mechanopathology of biofilm-like Mycobacterium tuberculosis cords	Cell	2023
Lung (Alveolus)	Mechanical control of innate immune responses against viral infection revealed in a human Lung Alveolus Chip	Nature Communications	2022
Lung (Alveolus)	The cGAS-STING pathway drives type I IFN immunopathology in COVID-19	Nature	2022
Lung (Alveolus)	Rapid endotheliitis and vascular damage characterize SARS-CoV-2 infection in a human lung-on-chip model	EMBO reports	2021
Lung (Alveolus)	A lung-on-chip model of early Mycobacterium tuberculosis infection reveals an essential role for alveolar epithelial cells in controlling bacterial growth	eLife	2020
Lung (Bovine)	Development and evaluation of a bovine lung-on-chip (bLOC) to study bovine respiratory diseases	In vitro models	2022

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Infectious Disease - Continued			
Organ	**Article**	**Journal**	**Year**
Lymph Node	DNA origami vaccine (DoriVac) nanoparticles improve both humoral and cellular immune responses to infectious diseases	bioRxiv	2024

Microbiome			
Organ	**Article**	**Journal**	**Year**
Cervix	Mucus production, host-microbiome interactions, hormone sensitivity, and innate immune responses modeled in human cervix chips	Nature	2024
Intestine (Caco2)	Characterization of an engineered live bacterial therapeutic for the treatment of phenylketonuria in a human gut-on-a-chip	Nature Communications	2021
Intestine (Caco2)	Effects of human milk oligosaccharides on the adult gut microbiota and barrier function	Nutrients	2020
Intestine (Caco2)	A complex human gut microbiome cultured in an anaerobic intestine-on-a-chip	Nature Biomedical Engineering	2018
Intestine (Caco2)	Human gut-on-a-chip inhabited by microbial flora that experiences intestinal peristalsis-like motions and flow	Lab on a Chip	2012
Intestine (Colon, mouse)	Frontiers in Cellular and Infection Microbiology	Frontiers in Cellular and Infection Microbiology	2021
Vagina	Modeling Healthy and Dysbiotic Vaginal Microenvironments in a Human Vagina-on-a-Chip	JoVE	2024
Vagina	Vaginal microbiome-host interactions modeled in a human vagina-on-a-chip	Microbiome	2022
Vagina, Cervix	Modulation of dysbiotic vaginal complications by cervical mucus revealed in linked human vagina and cervix chips	bioRxiv	2023

Model Development			
Organ	**Article**	**Journal**	**Year**
Blood	Organ-on-Chip Recapitulates Thrombosis Induced by an anti-CD154 Monoclonal Antibody: Translational Potential of Advanced Microengineered Systems	Clinical Pharmacology & Therapeutics	2018
Bone	Bone Chip System to Monitor Osteogenic Differentiation Using Optical Imaging	Microfluidics and Nanofluidics	2019
Bone Marrow (Mouse)	Bone Marrow Microenvironment-On-Chip for Culture of Functional Hematopoietic Stem Cells	Frontiers in Bioengineering and Biotechnology	2022
Brain	Human iPSC-Derived Endothelial Cells and Microengineered Organ-Chip Enhance Neuronal Development	Stem Cell Reports	2018
Intestine (Caco2)	SCRIB controls apical contractility during epithelial differentiation	Journal of Cell Biology	2023

Organized by Application

Model Development - Continued			
Organ	**Article**	**Journal**	**Year**
Intestine (Colon)	Human Colon-on-a-Chip Enables Continuous In Vitro Analysis of Colon Mucus Layer Accumulation and Physiology	Cellular and Molecular Gastroenterology and Hepatology	2020
Intestine (Colon and Duodenum)	Combining Human Organoids and Organ-on-a-Chip Technology to Model Intestinal Region-Specific Functionality	JoVE	2022
Intestine (Duodenum)	Direct therapeutic effect of sulfadoxine-pyrimethamine on nutritional deficiency-induced enteric dysfunction in a human intestine chip	eBioMedicine	2023
Intestine (Duodenum)	Establishment of physiologically relevant oxygen gradients in microfluidic organ chips	Lab on a Chip	2022
Intestine (Duodenum)	Nutritional deficiency in an intestine-on-a-chip recapitulates injury hallmarks associated with environmental enteric dysfunction	Nature Biomedical Engineering	2022
Intestine (Small)	An iPSC-derived small intestine-on-chip with self-organizing epithelial, mesenchymal and neural cells	bioRxiv	2024
Intestine (Small)	Development of a primary human Small Intestine-on-a-Chip using biopsy-derived organoids	Scientific Reports	2018
Kidney (Glomerulus)	An ultrathin membrane mediates tissue-specific morphogenesis and barrier function in a human kidney chip	Science Advances	2024
Kidney (Glomerulus)	Physiological Replication of the Human Glomerulus Using a Triple Culture Microphysiological System	Advanced Science	2023
Kidney (Glomerulus)	Directed differentiation of human induced pluripotent stem cells into mature kidney podocytes and establishment of a Glomerulus Chip.	Nature Protocols	2018
Kidney (Glomerulus, mouse)	REST and Stress Resistance in the Ageing Kidney	Journal of the American Society of Nephrology	2021
Lung (Airway)	Breathing on Chip: Biomechanical forces change airway epithelial cell biology in a human Airway Lung-Chip	Materials Today Bio	2023
Lung (Alveolus)	Organoid-based expansion of patient-derived primary alveolar type 2 cells for establishment of alveolus epithelial Lung-Chip cultures	American Journey of Physiology Lung Cellular and Molecular Physiology	2022
Lung (Alveolus) and Skin	Reconstituting Cytoarchitecture and Function of Human Epithelial Tissues on an Open-Top Organ-Chip	JoVE	2021
Lung (Alveolus) and Skin	A novel Organ-Chip system emulates three-dimensional architecture of the human epithelia and allows fine control of mechanical forces acting on it.	Biomaterials	2023

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Neuroscience			
Organ	**Article**	**Journal**	**Year**
Brain	Organ-Chips Enhance the Maturation of Human iPSC-Derived Dopamine Neurons	International Journal of Molecular Science	2023
Brain	A microengineered Brain-Chip to model neuroinflammation in humans	iScience	2022
Brain	Modeling alpha-synuclein pathology in a human brain-chip to assess blood-brain barrier disruption	Nature Communications	2021
Brain - Blood Brain Barrier	Evaluation of Drug Blood-Brain-Barrier Permeability Using a Microfluidic Chip	Pharmaceutics	2024
Brain - Blood Brain Barrier	Generation of a Human iPSC-Based Blood-Brain Barrier Chip	JoVE	2020
Brain - Blood Brain Barrier	Human iPSC-Derived Blood-Brain Barrier Chips Enable Disease Modeling and Personalized Medicine Applications	Cell Stem Cell	2019

Toxicology			
Organ	**Article**	**Journal**	**Year**
Bone Marrow	On-chip recapitulation of clinical bone marrow toxicities and patient-specific pathophysiology	Nature Biomedical Engineering	2020
Heart	Multi-lineage heart-chip models drug cardiotoxicity and enhances maturation of human stem cell-derived cardiovascular cells	Lab on a Chip	2024
Intestine (Colon & Duodenum); Lung	Human immunocompetent Organ-on-Chip platforms allow safety profiling of tumor-targeted T-cell bispecific antibodies	eLife	2021
Kidney (Glomerulus)	A Personalized Glomerulus Chip Engineered from Stem Cell-Derived Epithelium and Vascular Endothelium	Micromachines	2021
Kidney (Glomerulus)	Mature induced-pluripotent-stem-cell-derived human podocytes reconstitute kidney glomerular-capillary-wall function on a chip	Nature Biomedical Engineering	2017
Kidney (Proximal Tubule)	Human kidney proximal tubule-on-a-chip for drug transport and nephrotoxicity assessment	Integrative Biology	2013
Liver	Beyond the Hype and Towards Application: Liver Complex In Vitro Models in Preclinical Drug Safety	Expert Opinion on Drug Metabolism & Toxicology	2024
Liver	A human liver organoid screening platform for DILI risk prediction	Journal of Hepatology	2023
Liver	A novel approach to interrogating the effects of chemical warfare agent exposure using organ-on-a-chip technology and multiomic analysis	PLOS ONE	2023
Liver	Performance assessment and economic analysis of a human Liver-Chip for predictive toxicology	Communications Medicine	2023
Liver	Co-Culture of Human Primary Hepatocytes and Nonparenchymal Liver Cells in the Emulate® Liver-Chip for the Study of Drug-Induced Liver Injury	Current Protocols	2022

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Toxicology - Continued			
Organ	**Article**	**Journal**	**Year**
Liver	Utilization of a model hepatotoxic compound, diglycolic acid, to evaluate liver Organ-Chip performance and in vitro to in vivo concordance	Food and Chemical Toxicology	2020
Liver	Integrated in vitro models for hepatic safety and metabolism: evaluation of a human Liver-Chip and liver spheroid	Archives of Toxicology	2019
Liver (Human, dog, rat)	Reproducing human and cross-species drug toxicities using a Liver-Chip	Science Translational Medicine	2019
Lung (Alveolus)	A human lung alveolus-on-a-chip model of acute radiation-induced lung injury	Nature Communications	2023
Lung (Alveolus)	Reconstituting Organ-Level Lung Functions on a Chip	Science	2010
Review Article	Trust your gut: Establishing confidence in gastrointestinal models - An overview of the state of the science and contexts of use	ALTEX	2024
Review Article	The Future of Uncertainty Factors With In Vitro Studies Using Human Cells	Toxicological Sciences	2022
Review Article	Application of Microphysiological Systems to Enhance Safety Assessment in Drug Discovery	Annual Review of Pharmacology and Toxicology	2018
Review Article	Optimizing Drug Discovery by Investigative Toxicology: Current and Future Trends	ALTEX	2018

Organ-on-a-Chip Technology (Other)			
Organ	**Article**	**Journal**	**Year**
Liver, Intestine (Caco2)	Identification of pharmacological inducers of a reversible hypometabolic state for whole organ preservation	eLife	2024
N/A	An Information-Theoretic Approach for Measuring the Distance of Organ Tissue Samples Using Their Transcriptomic Signatures	Bioinformatics	2020
N/A	Introducing an automated high content confocal imaging approach for Organs-on-Chips	Lab on a Chip	2019
Review Article	Human organs-on-chips for disease modelling, drug development and personalized medicine	Nature Reviews Genetics	2022
Review Article	Opportunities and challenges with microphysiological systems: a pharma end-user perspective	Nature Reviews Drug Discovery	2020
Review Article	Organs-on-Chips in Clinical Pharmacology: Putting the Patient Into the Center of Treatment Selection and Drug Development	Clinical Pharmacology & Therapeutics	2019
Small Intestine, Colon, Cervix, Vagina, Lung (Airway)	Modeling mucus physiology and pathophysiology in human organs-on-chips	Advanced Drug Delivery Reviews	2022