

# Chip-S1<sup>®</sup> Basic Research Kit

Create custom Organ-Chip models to suit a wide variety of applications

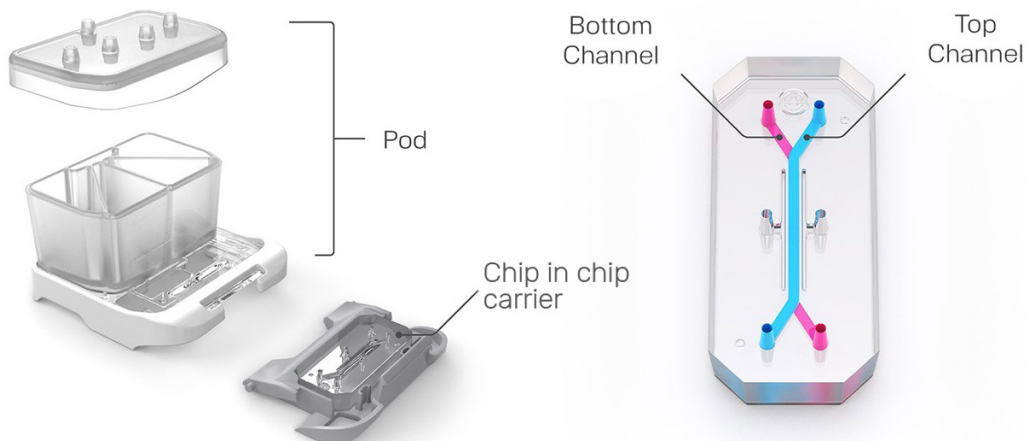


## Overview

An Organ-Chip is a living, micro-engineered environment that recreates the natural physiology and mechanical forces cells experience within the human body. With the Emulate Chip-S1 Basic Research Kit, you can harness the power of this complex microenvironment to build a wide variety of Organ-Chip models in the [Human Emulation System](#).

## Model Configuration

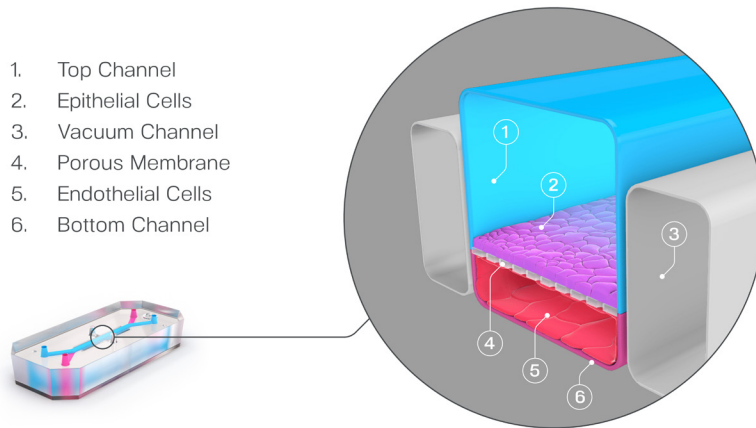
At the heart of the Chip-S1 Basic Research Kit is the **Chip-S1<sup>®</sup>** Stretchable Chip and accompanying **Pod<sup>®</sup>** Portable Module. The chip securely connects to the Pod via the chip carrier, and the Pod reservoir lid acts as the interface between [Zoë](#) and the chip.



**Figure 1:** Pod Portable Module and Chip-S1 diagram.

### Chip-S1 Stretchable Chip

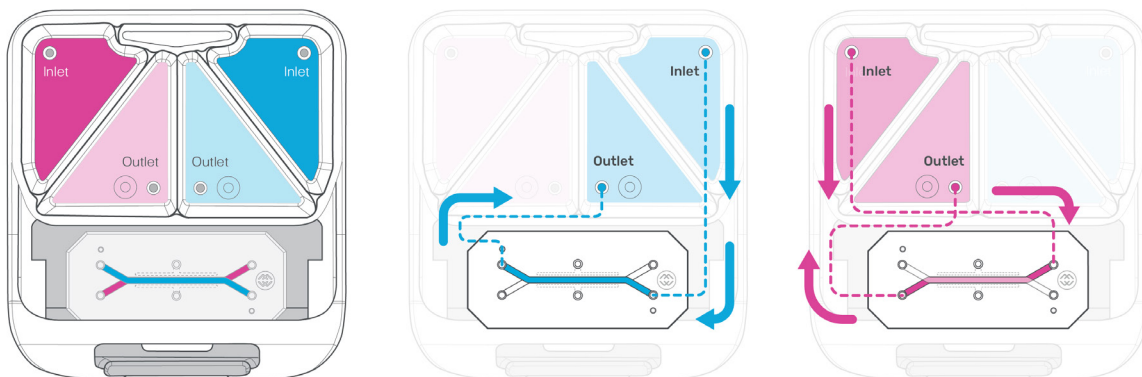
The Chip-S1 Stretchable Chip (see **Figure 2**) features two distinct microfluidic channels separated by a porous, flexible membrane. This configuration enables the co-culture of organ-specific epithelial/parenchymal cells in one channel and organ-specific vasculature in the other. Vacuum channels enable cyclic stretch on the membrane to mimic dynamic functions, such as breathing and peristalsis.



**Figure 2:** Chip-S1 diagram.

### Pod Portable Module

Each Chip-S1 connects to a Pod which, through Zoë, enables automated control of media flow and dosing while maintaining ease of portability for routine microscopy observation (see **Figure 3**). The Pod stores 4 mL of media for each microfluidic channel, enabling automated media flow for up to 5 days. Media effluent can be easily collected from the outlet reservoirs for downstream analysis.



**Figure 3:** Pod reservoir diagram.

## Key Features

- **Tissue-Tissue Interface**
  - Porous membrane permits compartment crosstalk and cell migration
  - Separate cell compartments enable controlled seeding and media delivery
- **Dynamic Environment**
  - Fluid flow through the channels creates shear stress that drives cell maturation and improves functionality
  - Tunable cyclic stretch recreates dynamic functions, such as breathing and peristalsis
- **Precise Microenvironment Control**
  - Automated fluid flow precisely controls media delivery and compound dosing
  - Reservoirs provide easy access to sample chip effluent for downstream analysis
  - Integrated platform simplifies the culture process
- **Microscope Compatibility**
  - Portable Pod reservoir enables easy mid-experiment cell viability and health checks on laboratory microscopes without interrupting fluid connections
  - Fixed Chip Imaging Adapter organizes up to 12 fixed chips for high-throughput imaging

## Part of the Human Emulation System<sup>®</sup>

The Emulate Chip-S1 Basic Research Kit is designed to be used as part of the [Human Emulation System](#), a complete Organ-on-a-Chip solution that includes instruments, consumables, and software, providing the dynamic conditions needed to culture up to 12 Organ-Chips.

In addition to the Chip-S1 Basic Research Kit, Emulate offers a number of companion products:

- Pod Imaging Adapter: for microscopic inspection during an experiment
- Fixed Chip Imaging Adapter: for post-experiment fixation, staining, and analysis
- Compound Distribution Kit: for assessment of PDMS compound absorption and adsorption for specific classes of small molecules



## Chip Specifications:

### Top Channel

Width x height dimensions	1,000 $\mu\text{m}$ x 1,000 $\mu\text{m}$
Area	28.0 $\text{mm}^2$
Volume	28.041 $\mu\text{L}$
Imaging distance from bottom of chip to top of membrane	850 $\mu\text{m}$

### Bottom Channel

Width x height dimensions	1,000 $\mu\text{m}$ x 200 $\mu\text{m}$
Area	24.5 $\text{mm}^2$
Volume	5.6 $\mu\text{L}$

### Membrane

Pore diameter	7.0 $\mu\text{m}$
Pore spacing	40 $\mu\text{m}$ (hexagonally packed)
Thickness	50 $\mu\text{m}$
Co-culture area	17.1 $\text{mm}^2$

## Kit Specifications:

### Specification

### Details

#### Compatible cell types

The open nature of the Emulate Chip-S1 Basic Research Kit makes it compatible with practically any type of human or animal cells, including:

- Primary cells
- Dissociated or intact organoids
- Induced pluripotent stem cells (iPSCs)
- Immortalized cell lines

#### Characterization endpoints

##### Image analysis

- Brightfield, fluorescence, and electron microscopy

##### Omics analysis

- RNAseq, proteomics, and metabolomics

##### Effluent analysis

- Cytokine release, injury markers, barrier function ( $P_{app}$ ), etc.

#### Storage conditions

- ER-1<sup>®</sup> Reagent: -20°C
- ER-2<sup>®</sup> Reagent: 2–8°C
- Other kit components: Ambient temperature (15–25°C)

#### Shelf life

- Organ-Chip consumables: 2 years from date of manufacture
- Pod-S1/A1 consumables: 1 year from date of manufacture
- ER-1 & ER-2: 1 year from date of manufacture

#### Sterility

All consumables are terminally sterilized with gamma irradiation in final packaging

## Ordering Information

Kits are available in sets of 12 or 24 chips, with the following consumables:

- Chip-S1<sup>®</sup> Stretchable Chip in a Chip Carrier
- Pod<sup>®</sup> Portable Module
- ER-1<sup>®</sup> / ER-2<sup>®</sup> Chip Activation Reagents

Product Name	Kit Contents	Catalog Number
<b>Emulate Chip-S1 Basic Research Kit (12-pack)</b>	12 sets of chips, plus 4 Steriflip <sup>®</sup> filters	BRK-S1-WER-12
<b>Emulate Chip-S1 Basic Research Kit (24-pack)</b>	24 sets of chips, plus 8 Steriflip <sup>®</sup> filters	BRK-S1-WER-24

## Companion Products:

Product Name	Description	Catalog Number
<b>Pod Imaging Adapter</b>	Organizes 2 Pods for quick cell viability and health checks and ensures compatibility with SBS footprint inverted microscopes	POD-IMG
<b>Fixed Chip Imaging Adapter</b>	Organizes 12 fixed chips for high-throughput imaging and ensures compatibility with SBS footprint imaging equipment	CHIP-IMG
<b>Compound Distribution Kit</b>	Includes 3 test chips, 3 Pods, and 2 Steriflip filters. Used to quantify compound absorption and adsorption for specific classes of small molecules to PDMS	CDK-001