# ORGAN ON CHIP

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**Abstract:** Clinical studies take years to complete and testing a single compound can cost more than $2 billion. Meanwhile, innumerable animal lives are lost, and the process often fails to predict human responses because traditional animal models often do not accurately mimic human pathophysiology. For these reasons, there is a broad need for alternative ways to model human diseases *in vitro* in order to accelerate the development of new drugs and advance personalized medicine.

So, scientists have adapted computer microchip manufacturing methods to engineer microfluidic culture devices that recapitulate the microarchitecture and functions of living human organs, including the lung, intestine, kidney, skin, bone marrow and blood-brain barrier, among others. These microdevices, called 'Organs-on-Chips' (Organ Chips), offer a potential alternative to traditional animal testing. Each Organ Chip is composed of a clear flexible polymer about the size of a computer memory stick that contains hollow microfluidic channels lined by living human organ-specific cells interfaced with a human endothelial cell-lined artificial vasculature, and mechanical forces can be applied to mimic the physical microenvironment of living organs, including breathing motions in lung and peristalsis-like deformations in the intestine. They are essentially living, three-dimensional cross-sections of major functional units of whole living organs. Because they are translucent, they provide a window into the inner workings of human cells in living tissues within an organ-relevant context.