Ladies and gentlemen, have you ever considered that all the medicines and cosmetics we use today, have gone through the processes of animal testing which kills thousands of lives and increased the financial burden of the research institutes.

This is the reason why I’m presenting you today, “The Tissue Simulating Technology-Organ-Chip for Drug Testing”. The Microchips lined by living human cells that could revolutionize drug development, disease modeling and personalized medicine. So the content of today’s presentation will be the mechanism of organ-on-a-chip; the advantages of it and The future that it reveals.

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.

Wyss Institute researchers and a multidisciplinary team of collaborators have engineered microchips that integrated the microarchitecture and functions of living human organs, including the lung, intestine, kidney, skin, and bone marrow. These microchips, called ‘organs-on-chips’, offer a potential alternative to traditional animal testing. Each individual organ-on-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 cells, and mechanical forces can be applied to mimic the physical microenvironment of living organs, including breathing motions in lung. Because the microdevices are transparent, they provide a window into the inner workings of human organs.

*Let me introduce how it works.*

**The circulating blood substitute will keep the cells alive and can be used to introduce chemical or biologic agents, as well as potential therapies, into the system. Hollow channels will automatically guide the toxins or therapies that are being evaluated from one tissue to the next and sensors will measure real-time temperature, oxygen levels, PH and other factors.**

*Now let’s evaluate its significance in medicine testing.*

With their ability to host and combine the different cell and tissue types making up human organs, organs-on-chips present an ideal microenvironment to mimic human-specific pathophysiology and enable molecular-scale analysis and identification of new therapies. They even allow recreating therapeutically relevant interfaces like the blood-brain-barrier to facilitate discovery of new drug delivery platforms or culturing living microbes in direct contact with living human cells to enable insights into how these microbes influence health and disease.

To mimic the interconnectedness of organs within humans, Wyss researchers also have developed an automated instrument to link multiple organs-chip together by their common vascular channels. This instrument, designed to mimic whole-body physiology, controls fluid flow and cell viability and analyze complex interconnected biochemical and physiological responses across ten different organs. This holistic “human body-on-chip” approach will be used to rapidly evaluate systemic responses to new drug candidates, providing higher-level information on their safety and efficacy.

Current work at the Wyss Institute is now focused on developing specific human disease models to identify new therapeutic targets, facilitate vaccine development, develop novel organ-specific drug delivery systems, and explore the potential of the technology for personalized medicine. Wyss researchers are also investigating the use of digital manufacturing to automate fabrication of organs on chips and increase complexity of the devices, as demonstrated by development of the first entirely 3D-printed organ on a chip – a heart on a chip.

The Wyss Institute is currently seeking partners in their research and development efforts towards development of novel technologies for organ-specific targeting and drug delivery as well as potential therapeutics that have been discovered using the organ-on-chip platform. *And I believe in the near future, we’ll no longer need to kill animals for testing because we’ve got a better and more reliable method.*