

# FULLY AUTOMATED MULTI-ORGAN-CHIP ASSAY EXECUTION AND ANALYSIS

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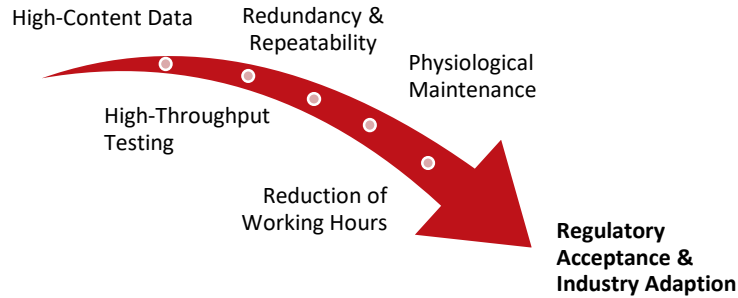
## Introduction

Microphysiological System Handling Challenges:

- Manual effort evolving with complexity of organ combinations
- Limitations to feeding regimen and observation
- Interruption of cell culture conditions
- User and lab dependent variability

Immediate demand to automate MPS

Advantages of Automation:



## Method



Safety Cabinet

Handling  
• Chip maintenance  
• Transport

Platform  
• 24x Multi-Organ-Chips  
• Incubation and pumping

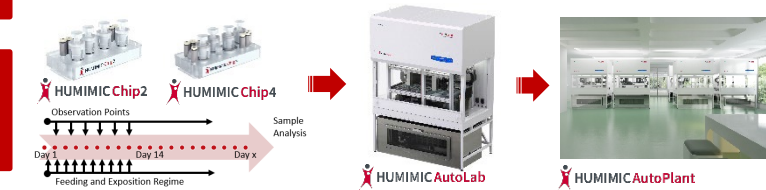
Microscopy  
• Bright field microscopy  
• Fluorescence imaging

Cold Storage  
• Media and samples  
• Automatic provisioning

Development of a Multi-Organ-Chip robot, the **HUMIMIC AutoLab**:

- Cultivation of 24 Multi-Organ-Chips simultaneously
- Incubation and systemic pulsatile media circulation
- Media exchanges, substance application and sample extraction
- Routine microscopic analyses and in-process quality control
- Sterile conditions for liquid handling
- Media, substance and sample storage at 4°C and automatic provisioning
- Cell culture material supply
- **HUMIMIC LabOS**: Dedicated assay specification and data analyzation software\*

Automation set-up for up to 192 chips in parallel:



## Results

Comparability test assay intestine and liver co-culture:

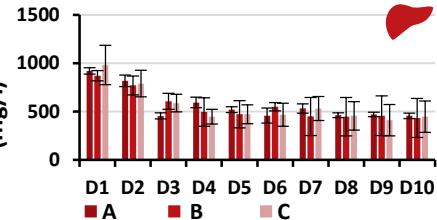
Intestine Model  
Epitestinal™  
96well-size

Liver model  
40 liver spheroids/  
circuit

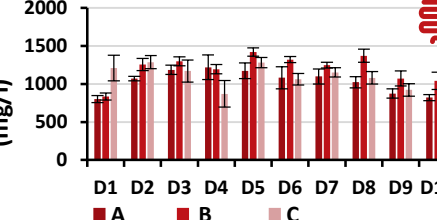
Conditions:

- A Incubator with CO<sub>2</sub>
- B Incubator w/o CO<sub>2</sub>
- C HUMIMIC AutoLab

Lactate production (mg/l)



Lactate production (mg/l)



## Conclusion

Employing the **HUMIMIC AutoLab** for MOC cultivation does allow for more complex and physiological MOC assays, a closer observation of the processes in the chip, possible new findings through e.g. machine learning, while at the same improving standardization and comparability of acquired data and reducing manual effort.