

## 附件四、技術說明表



### 一種體外三維組織培養裝置及操控方法

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**簡歷：**

<https://www.iam.ntu.edu.tw/zh/component/content/article/166-member/professors/professor-info/1204-yu-hsiang-hsu?Itemid=819>

**市場及需求：**

目前在藥物開發中的臨床前試驗是以動物模型及使用培養皿培養人類細胞為主，但動物模型因物種不同及基因表現上的差異，造成發展出的藥物功能性低下及具有細胞毒性之問題。而在培養皿中所獲得的研究成果則因培養環境與體內的生理環境不同而造成誤判。因此器官晶片及微生理系統已被視為下一個世代的臨床前試驗系統，其優勢是可在晶片中使用人類的細胞，還原人體體內三維細胞組織結構、外間質結構、及微生理環境，可應用來進行藥物開發所需之藥物功能性、藥物毒性、及個人化精準治療之研究。

**技術摘要(含成果)：**

本技術是一種微生理系統，在此系統中可以植入以各種技術所培養出的三維人類組織或類器官、以及從人類檢體所獲得的三維組織，並可與各式內皮細胞等進行共培養。此系統可提供體內之微生理環境，使其能發展成具有功能性血管的體外人類三維組織，發展成正常或疾病的體外模型，提供可模擬具體內血管功能的三維人體組織模型，可用以提升在進行人體實驗前藥物功能及藥物毒性研究的量化工作，確認藥物功效及毒性，並可用來作為病人個人化的精準醫療之研究。

**優勢：**

1. 此裝置可提供具血管網絡之正常組織，以供藥物毒性的定量研究。
2. 此裝置可提供具血管網絡之疾病組織，以供藥物功能性的定量研究。
3. 此裝置可應用在病人疾病組織檢體，可以協助醫師進行藥物選擇、藥物劑量判定、以及治療對策之訂定。

**競爭產品：**

1. Emulate 晶片系統
2. CellASIC 晶片系統

**專利現況：**

1. 本技術已有相關專利申請案
2. 本研究團隊具有接近十五年器官晶片及微生理系統研究經驗

**聯絡方式(請不用填)：**

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## AN IN VITRO 3-D TISSUE CULTURE DEVICE AND METHOD TO USE

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### **Experience:**

<https://www.iam.ntu.edu.tw/zh/component/content/article/166-member/professors/professor-info/1204-yu-hsiang-hsu?Itemid=819>

### **Market Needs:**

Animal models and flat biology are the current methods used for preclinical study in drug development. However, due to genetic differences, drugs developed using animal studies usually lack efficacy and can have serious toxicity. On the other hand, a regular culture dish cannot be reproduced in an *in vivo* physiological environment. Therefore, the quantitative results could have a considerable deviation. Thus, organ-on-a-chip and microphysiological systems have been considered the next-generation drug development systems for preclinical studies. The advantage is that these systems use human cells, and they can reproduce 3-D tissue, extracellular structures, and physiological environments. It can be applied to studying drug functionality, toxicity, and personalized precision medicine.

### **Our Technology:**

This technology is a microphysiological system (MPS). This system can implant all types of 3-D human tissue and organoids developed by various methods. Human tissues can also be implanted. Our technology can create different physiological environments to enable the co-culturing of these tissues with endothelial cells and stimulate them to develop into a vascularized normal tissue or disease model. This MPS can use the functional vessels to conduct preclinical studies to quantify drug efficacy and toxicity. It can also be applied to developing a patient-specific personalized medicine disease model.

### **Strength:**

1. This microphysiological system can develop vascularized normal human tissue for quantitative drug efficacy study.
2. This microphysiological system can develop vascularized disease human tissue for quantitative drug toxicity study.
3. This microphysiological system can be applied to patient-specific tissue to assist doctors in determining treatment strategies and identifying drugs and dosage levels.

### **Competing Products:**

1. Emulate chip systems.
2. CellASIC chip systems.

### **Intellectual Properties:**

This technology has patent applications on file.

The team has 15 years of experience in organ-on-a-chip and microphysiological systems.

### **Contact (do not need to fill out):**

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