工業技術研究院
Industrial Technology Research Institute

細胞生產自動化系統

技術簡介

細胞治療產業應用需求擴大，細胞來源侷限，同時需要優良品管與安全性、有效性管控。目前細胞生產主要以人力操作為主，無細胞生產 GMP 工廠。法人現階段 GTP 實驗室滿載，已經無法支應產業龐大需求。且細胞產品需要具規模，標準規格與工業化生產技術。工研院生醫所針對細胞治療應用需求開發細胞智能化/自動化生產系統，使細胞生產自動化，降低勞力與不良率的成本，封閉的製造設備，降低細胞汙染的風險。ITRI細胞生產自動化系統為第一套包含細胞培養、品質檢測及收穫繼代等功能完整之系統，並可依據細胞生產製程客製化搭配各模組應用。

技術特性

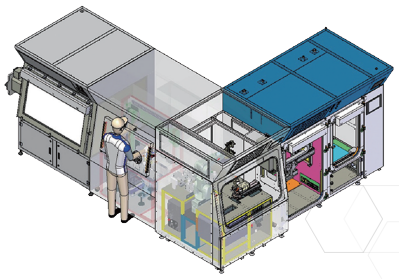
- 自動環境控制CO_2細胞培養模組
- 細胞收穫與繼代Robot自動化作業模組
- 雙物鏡細胞培養智能監控模組
- 細胞培養物料進出作業模組

技術優勢

- 可同時處理36組T75、T150、Hyper Flasks等不同細胞培養容器之傳送與定位取放作業
- 自動化細胞收穫繼代流程，Robot取代換液、收穫及繼代培養等人工作業
- 具備細胞計數、微生物污染偵測功能、細胞檢測影像自動存檔與查詢功能

應用範圍/產業效益

- 細胞庫建置儲存
- 細胞組織再生修復
- 細胞產品品質控制
- 細胞治療



▲ ITRI 貼附型細胞自動化生產系統

細胞培養	影像檢測	自動換液	收穫繼代
自動環境控制CO_2細胞培養模組 • 可同時處理36組T75、T150、HYPERFLASKS等不同細胞培養容器之傳送與定位取放作業 • 內建H_2O_2滅菌與溫濕度控制系統 • 內建HEPA符合CLASS100等級之生醫作業艙體	**雙物鏡細胞培養智能監控模組** • 具備細胞計數、微生物污染偵測功能 • 細胞檢測影像自動存檔與查詢功能 • 可程式控制10x,4x物鏡切換及量測點位	**細胞可程式定量自動換液模組** • 可依照培養配方進行定量自動換液作業 • 可取代開蓋、倒除廢液、更換新液等人工作業 • 換液定量精度≦±1ML	**細胞收穫與繼代自動化作業模組** • 可自動進行T75FLASK細胞換液與收穫作業 • 可自動完成T75到HYPERFLASK的細胞繼代作業 • 機器手臂自動執行物料定位與進出料作業 • 可取代換液、收穫及繼代培養等人工作業

▲ 細胞生產資料庫

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Automatic Cell Production System

Introduction

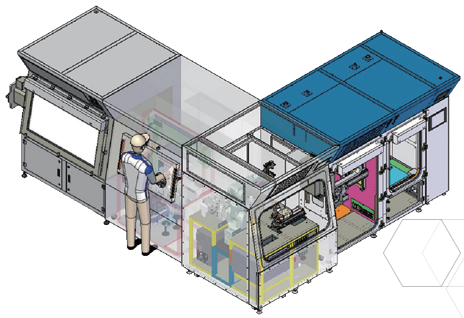
Automatic cell production system, including cell culture, cell image detection, cell medium exchange, cell subculture and harvesting. The system contributes to the cell production for regenerative medicine and cell therapy.

Features

- Automatic CO_2 regulated cell incubator
- Automatic cell subculture and harvesting
- Artificial intelligence cell imaging
- Programmed cell medium exchange

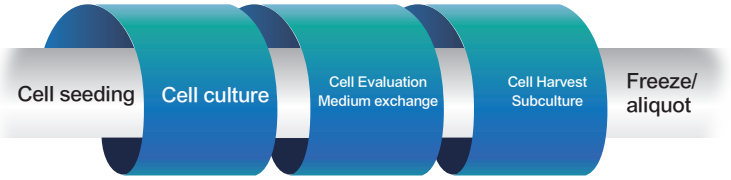
Technology Advantages

- Simultaneously transporting and positioning 36 groups of T75 flask/T150 flask/HYPER flask
- Cell counting, contamination detection, images recording and monitoring
- Medium is exchanged automatically based on scheduling



Applications

- Cell banking/storage
- Tissue engineering for regeneration
- Quality control of cell product
- Cell therapy



Cell Culture	AI Imaging	Medium Exchange	Cell Subculture
Automatic CO_2, regulated cell incubator • Simultaneously transporting and positioning 36 groups of T75 flask/T150 flask/HYPER flask • Build-in H_2O_2 sterilization and temperature/humidity control system • Build-in HEPA and class 100 clean	**AI cell imaging** • Cell counting, contamination detection • Cell images recording and monitoring • Programmable 10x, 4x objective lenses switch and measuring system	**Programmed Cell medium exchange** • Medium is exchanged automatically based on scheduling • Replace manual labor • Medium exchange volume precision ≦+1 ml	**Automatic cell subculture and harvesting** • T75 flask culture medium exchange T75 flask to Hyperflask subculture and harvest • Material positioning executed by robotic arms • Replacement of manual labor of medium exchange, harvesting and subculture extraction

▲ Cell - manufacturing Data Bank

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