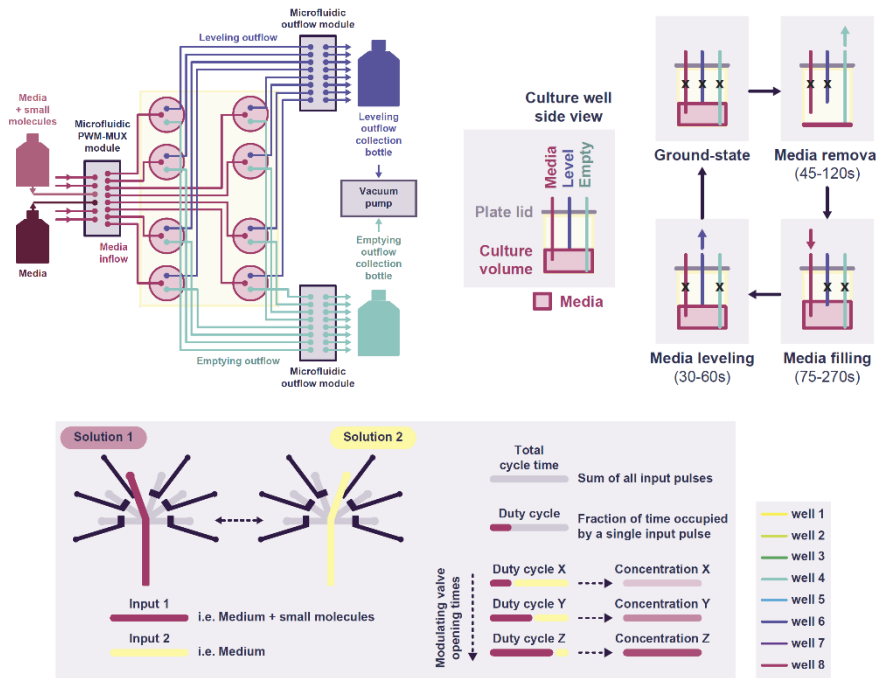


Automated system for dynamic stem cell and organoid culture in standard multi-well plates



Ref. Nr

6.2267

Keywords

Fully automated cell culturing system, microfluidic control, microfluidic media formulator, cell / organoid / embryo tissue explant culture under dynamically modulated media formulations in standard multi-well plates

Intellectual Property

EP 22 173 320.7

Publications

Accepted in Cell Reports Methods

Date

13/06/2022

Automated system for dynamic stem cell and organoid culture in standard multi-well plates. Top left, layout of the automated cell culturing system, with media dynamically formulated and routed through microfluidic modules, entering culture chambers from the top via an engineered plate lid. Top right, side view of individual culture well, with full media exchange cycle shown. Bottom, schematic for the pulse-width modulated dynamic media mixing.

Description

In vitro biological models such as stem cell or 3D cell cultures (e.g. organoids, gastruloids, tissue explants) represent powerful tools to explore the biology and disease state of complex biological systems, as well as potential targets for therapy. However, current batch cultures afford extremely limited temporal control over the media composition and therefore the possibility to dynamically control the cellular environment.

The technology solves this shortcoming by combining the power of microfluidic control and system automation with the flexibility of standard multi-well tissue culture plates.

Advantages

- Compatible with complex cell cultures.
- Enables to define dynamically changing media formulations (e.g., frequency of media exchange cycles, full versus partial media exchanges, timed cellular

stimulation, cell culture under defined cytokine or drug concentrations or temporally modulated concentration profiles, etc.)

- Fully automated & imaging-compatible cell culturing.
- Compatible with any commercially available tissue culture plates.

Applications

- Automated cell culture under precisely regulated and highly consistent conditions
- Drug testing, personalized precision medicine, stem cell differentiation, tissue engineering, regenerative medicine
- Administration of complex drug treatment schemes for testing & biomedical applications
- Investigation of cell fate specification in response to time varying signaling dynamics