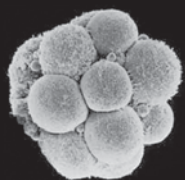


Cellomics



3D-CellHOST™ – Convenient high yield cell culture

Hamilton and Global Cell Solutions recently launched the BioLevigator™ a revolutionary benchtop cell culture device which can grow four independent and high density cell cultures in parallel. Here, we report the integration of the BioLevigator™ into Hamilton's liquid handling platform. This unprecedented cell culture automation system impresses by its ease-of-use combined with an optimised cell culture workflow. Furthermore, it renders high yield cell cultures on a small footprint. 200x10⁶ CHO-K1 (Chinese Hamster Ovary cells) were obtained in one LeviTube™ (50 mL cell culture tube) that corresponds to the yield of about 20 standard T75 cell culture flasks.

Benefits

- The GEM-microcarrier and BioLevigator technology optimize the traditional cell culture workflow leading to better standardization and more relevant cells
- The 3D-CellHOST fully automates the time consuming process of culturing cells thereby rendering high yield cultures
- The user friendly software streamlines all relevant information from the 3D-CellHOST and gives the user real-time and full control over the cell culture process



Figure 1: 3D-CellHOST. STARlet with one integrated BioLevigator.

Protocol

CHO-K1 cells were harvested from T75-cell culture flasks and the cell number was determined. Global Eucoryotic Microcarriers (GEM™) with gelatin coating from GCS were used for the following culture experiments. The GEM™ is designed to maintain the unique in vivo phenotype of cell lines while supporting high-density cell cultures in the BioLevigator™. As a magnetic microcarrier, the GEM™ can be controlled during medium exchange and culture harvesting.

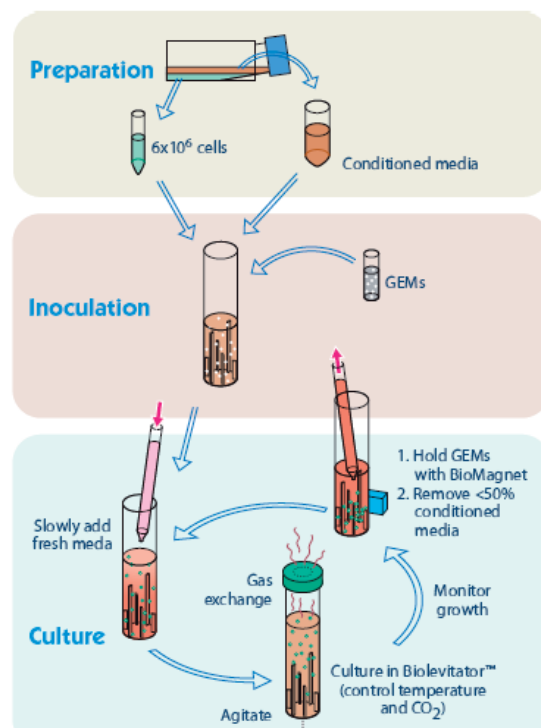


Figure 2: 3D-cell culture workflow using the GEM-technology.

Three cell cultures were set up in LeviTubes™ with 0.5 mL GEMs™, 1.0 mL GEMs™, and 2.0 mL GEMs™ mixed with 6x10⁶ cells/mL, 12x10⁶ cells/mL, and 24x10⁶ cells/mL, respectively. The LeviTubes™ were placed in the BioLevigator and the experiment was started. The experiment parameters for the inoculation phase and the culture phase are depicted in table 1. CO₂ and temperature were monitored during the complete experiment and were kept at 5% and 37°C, respectively.



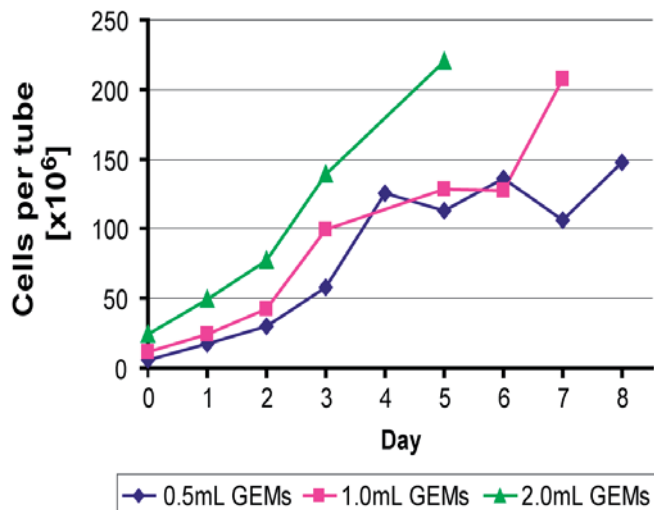


Figure 3: Typical growth curves of CHO-K1 cells in the BioLevigator.

In order to control the growth and fitness of the cells, 1mL of the cell/GEM™ suspension was sampled daily and pH as well as cell number were determined. Typical growth curves are shown in figure 3.

The 3D-CellHOST™ control software streamlined all relevant information from the STAR^{let} as well as from the integrated BioLevigator™. The user was informed in real-time about the actual state of the experiment in the different cultures, temperature and CO₂-concentration in the BioLevigator™. Further, the user could start at any time a sampling process or an additional media change on one of the cultures.



Figure 4: The 3D-CellHOST software impresses by its ease-of-use. It streamlines all information from the system.

www.hamiltonrobotics.com



Figure 5: LeviTube™. Tube optimized for the culture of cells in the BioLevigator™. Further, the lids are automation friendly and can be opened using the CORE-technology of the pipetting channels.

Discussion

Culturing cells is highly labor intensive and consumes lots of labwares like cell culture flasks and serological pipettes. Furthermore, some cell lines are delicate to handle. The results are low yields and poor standardization. Therefore, cell biologists are looking for ways to automate cell culture

processes and for technologies to improve the traditional cell culture workflow.

Traditional automated solutions imitate the manual handling of cells. These systems are usually very big, expensive and quite slow. One reason for this is that there are lots of transport steps to bring the cell culture flasks with cells to the liquid handling platform and back to the incubator. The 3D-CellHOST™ eliminates most of these transports by integrating the incubator, i.e. the BioLevigator, in the workspace of the Hamilton liquid handling platform, the STAR. The cells do not have any longer to be transported; they are easily accessible for media changes and other processes.

The cells are cultured in the LeviTube™, a tube that has been optimized for the BioLevigator (Fig. 5). A unique feature of the LeviTube™ is the automation-friendly lid that can be opened using Hamilton's CO-RE-technology. The maximal volume of one LeviTube™ is 50 mL wherein up to 200x10⁶ CHO-K1 cells can be grown (Fig. 2). This corresponds to an equivalent of about 20 T75-flasks. This high cell numbers lead to increasing consumption of medium during the culture. To guarantee optimal culture conditions the medium has to be changed several times a day. For this, automation is a prerequisite.

In conclusion, in one LeviTube™ 200x10⁶ CHO-K1 cells were grown. This gives a yield of 800x10⁶ cells (equivalent of 80 T75-flasks) for one BioLevigator with four cultures. This high cell numbers need automation to maintain optimal culture conditions. The 3D-CellHOST presents the complete automated solution. This clever cell culture automation system is simple scalable and impresses by its ease-of-use combined with an optimised cell culture workflow. The 3D-CellHOST™ elevates automated cell culture to a new level.

HAMILTON

GLOBAL CELL SOLUTIONS

Lit. No. MR-1001-01/00 ©HAMILTON Bonaduz AG 01/10 Printed in Switzerland

Headquarters

Europe - HAMILTON AG
Via Crusch 8, CH-7402 Bonaduz
Switzerland
infoservice@hamiltonrobotics.com
Americas - HAMILTON Robotics
4970 Energy Way
Reno, Nevada 89520 USA
sales@hamiltoncompany.com

United Kingdom

HAMILTON Robotics Ltd
6120 Gnd Floor Knights Court
Solihull Parkway, Birmingham
Business Park, B37 7WY, UK
Telephone: +44-121-717-0199
Fax: +44-121-717-0209
info.gb@hamiltonrobotics.com

Germany, Austria, Benelux

HAMILTON Robotics GmbH
Fraunhoferstr. 17
D-82152 Martinsried
Germany
Telephone: +49-89-5526-49-0
Fax: +49-89-5526-49-10
info.de@hamiltonrobotics.com

France

HAMILTON Robotics S.A.R.L.
Parc du Moulin de Massy
37 rue du Saule Trapu
F-91300 Massy/France
Telephone +33-1-69-75-16-16
Fax +33-1-60-11-57-16
info.fr@hamiltonrobotics.com

Italy

HAMILTON Italia
Via Tadino 52
IT-20124 Milano
Italy
Telephone +39-02-2953 3722
Fax +39-02-2940 1778
info.it@hamiltonrobotics.com

Scandinavia

HAMILTON Robotics ApS
Ny Kongens Gade 10,2
DK-1472 Copenhagen
Denmark
Telephone: +45-70-26-4499
Fax +49-89-5526-49-10
Info.de@hamiltonrobotics.com

China

HAMILTON AG Shanghai Rep. Office
German Centre, 88 Keyuan Road
Zhangjiang Hi-Tech Park,
Pudong, 201203 Shanghai, PRC
Telephone +86.21.2898-6567
Fax +86.21.2898-6275
info.cn@hamiltonrobotics.com