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Application of INNOSHAKER™ STAR Fully Automatic Incubator in CHO Cell Culture

Abstract

Cell culture is a critical process in the biopharmaceutical field for producing various biological drugs, including proteins, antibodies, and vaccines. CHO (Chinese Hamster Ovary) cells are among the most commonly used cell lines due to their favorable growth characteristics and high expression capabilities. Optimizing the CHO cell culture process is essential to meet the demands of large-scale production.

The INNOSHAKER™ STAR fully automatic incubator is an advanced automated cultivation device featuring an intelligent control system that allows precise settings for temperature, humidity, and CO_2 concentration, along with real-time monitoring, automatic calibration, and data recording functions. It serves as a powerful tool for enhancing cell culture efficiency.

Results and Discussion

Analysis and interpretation of experimental data obtained from the CHO cell culture process using the INNOSHAKER™ STAR led to the following conclusions:

Culture Results: "Excellent"

In the INNOSHAKER™ STAR, with parameters set at 37°C and 5% CO_2 concentration, CHO cells were cultured using 250 mL shaking flasks (125 rpm), 50 mL shaking tubes (250 rpm), and 24-well deep plates (225 rpm). Images were captured at 24-hour intervals, demonstrating the growth changes of cells from Day 0 to Day 3 post-inoculation:

Day 0

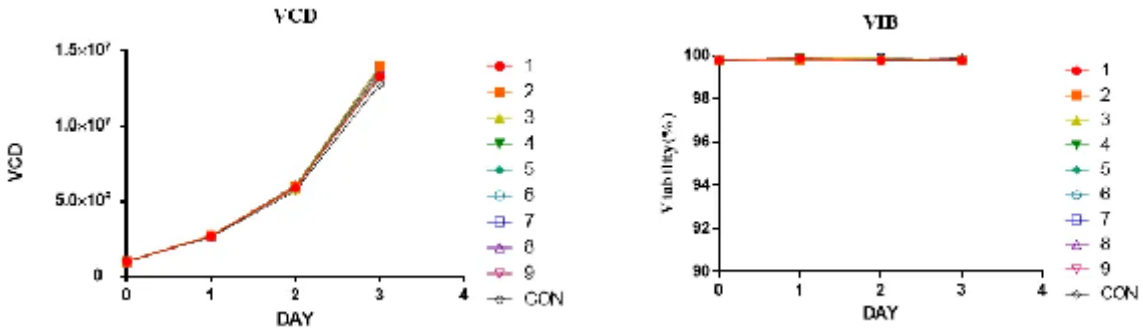
Day 1

Day 3

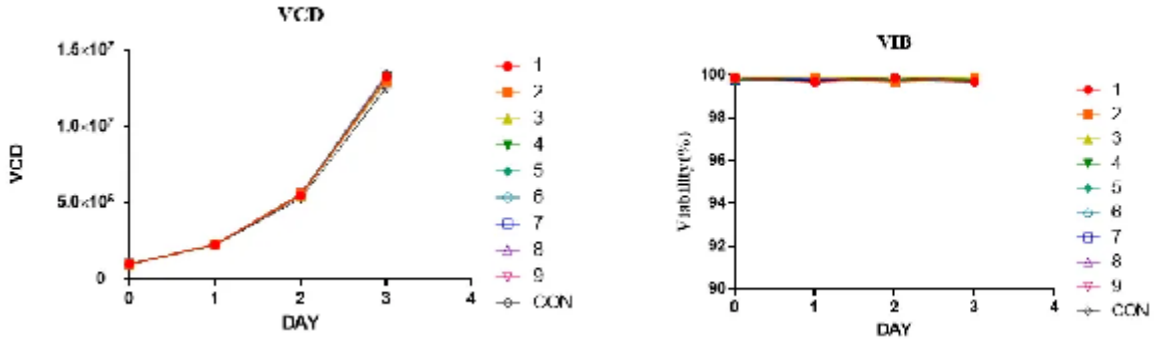
Day 4

Brightfield microscopy results indicate that CHO cells exhibited good growth throughout the culture period, with no contamination observed. The cells displayed clear contours and boundaries, and the cell density increased rapidly day by day.

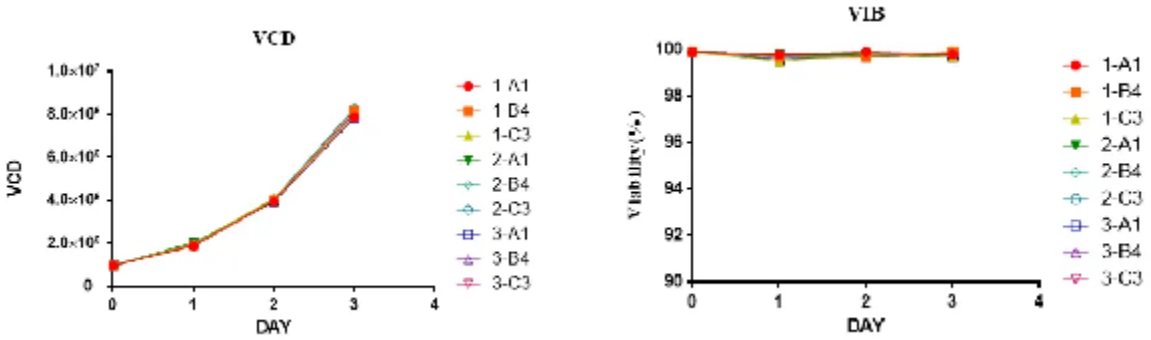
#1-9 Shaking Flasks, Initial Density: 1E6, Volume: 100 mL



#1-9 Shaking Tubes, Initial Density: 1E6, Volume: 20 mL



#1-3 Plates (3 wells each), Initial Density: 1E6, Volume: 3 mL



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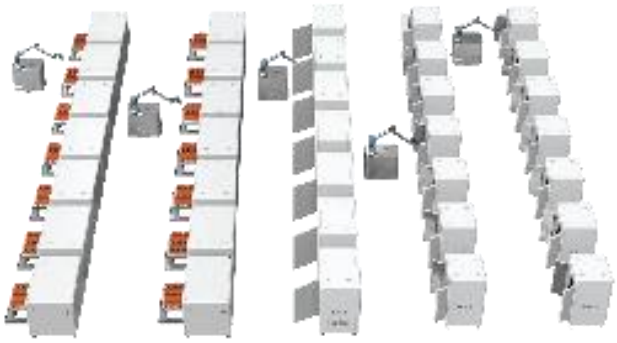
Cell viability (VIB) and viable cell density (VCD) data showed that the viability of both initial cell populations remained stable after 3 days of culture, with cell density increasing exponentially over time.

Culture Efficiency: "High"

The INNOSHAKER™ STAR is compatible with various culture consumables such as shaking flasks, tubes, and plates, accommodating up to 8 x 5 L culture flasks (with equivalent scale parameters). The device supports dual-layer stacking and multi-column arrangement, effectively amplifying the culture capacity. When operating multiple devices in parallel, a single control panel allows comprehensive oversight.

The entire experimental process requires minimal effort, as operators only need to inoculate cells into the corresponding consumables. The robotic arm automatically places them onto the incubator racks, while the control system monitors the operation. There is no need to remove cells during the experiment; cell dynamics can be observed directly from a computer terminal.



Parameter Control: "Stable"

Throughout the experiment, the INNOSHAKER™ STAR's sensors and monitoring equipment maintained stable conditions for temperature, humidity, and CO_2 concentration: temperature remained at 37°C, humidity at 80%, and CO_2 concentration at 5%. This precise control contributes to a stable cultivation environment, protecting cells from adverse effects. Additionally, in terms of sterilization and disinfection, the INNOSHAKER™ STAR offers unique advantages, including standard configurations for UV sterilization and 90°C high-temperature sterilization, effectively eliminating microorganisms and ensuring critical biosafety for cell culture.

Conclusion

This study validates, through data analysis, that the INNOSHAKER™ STAR fully automatic incubator can efficiently support the growth and proliferation of CHO cells. By automating operations and monitoring, it significantly enhances culture efficiency and reduces human error, providing a feasible solution for large-scale CHO cell culture. Beyond CHO cells, the INNOSHAKER™ STAR can also be applied to other cell lines and biopharmaceutical processes, offering precise control, real-time monitoring, and data recording, thus advancing technology and innovation in the field of cell culture. It is an invaluable asset for any research team involved in cell culture.