Development of Chemically Defined Medium for Vero Cells

Gerco van Eikenhorst¹, Bella Monica¹, Roni Hazan Brill², Emilie Rodrigues¹, Yvonne Thomassen¹

1 Intravacc, Bilthoven, The Netherlands
2 Biological Industries (BI), Bet Haemek, Israel.

Introduction

Cell culture media, including currently available animal component free media, contain undefined polypeptides. To optimise the cell and virus culture it is desirable to know which nutrients are depleted at the different cultivation phases. However, media containing undefined ingredients makes this more challenging. Therefore, a chemically defined medium is needed.

Methods and Results

During development Vero cells were cultured in several media formulations and compared with a commercially available animal component free (ACF) culture medium. After each set of experiments the formulations were adjusted. As the media formulations improved the culture methods also advanced, from static T-flask culture to Spinner cultures (Figure 1) and finally bioreactor cultures (Figure 2). Primary parameters used for Vero cell growth evaluation were microcarrier coverage, maximum cell density and growth rate.

Chemically defined BiCD-J showed promising results in bioreactor cultures (N=3). Microcarriers were fully and equally covered after 5 days of culture and maximum cell concentration (Cmax) was 1.5 × 10⁶ cells/mL with a specific growth rate (μ) of 0.035h⁻¹. These results are similar to the maximum cell concentration and specific growth rate in commercial ACF medium were Cmax = 1.4 × 10⁶ cells/mL and μ = 0.025h⁻¹.

Virus Propagation

Two different media formulations (BiCD-J and BiCD-K) were selected to evaluate the capability to support virus propagation. Cells were infected with Measles, Enterovirus 71-C4 and Sabin type 1 poliovirus. The differences in titers observed using the various culture media indicate that the nutritional needs may differ between viruses.

BiCD-J is a new developed, fully chemically defined and animal component free culture medium which supports Vero cell growth in static and bioreactor cultures and is able to support propagation of different types of viruses.

Conclusion

BiCD-J is a new developed, fully chemically defined and animal component free culture medium which supports Vero cell growth in static and bioreactor cultures and is able to support propagation of different types of viruses.

In addition, yields for Vero cell growth and infectious virus particles are equal to a commercial available ACF medium containing less well-defined plant extracts. Biological Industries will refer to this medium as NutriVero™ Flex 10.