Disposable Large Volume Spinner Flasks Provide Versatile and Economical Options for Scale Up of Suspension Cell Cultures

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Introduction

Background

Suspension cell culture in large scale production is increasingly being integrated into drug discovery campaigns, and suitable scale up vessels for suspension growth are evolving to keep pace. Historically, either disposable plastic shaker flasks or glass spinner vessels have been used for such culturing. However, shaker flasks have a mechanism of agitation that is different from spinner vessels which can negatively impact scale up efficiency, and glass spinner vessels require time consuming and costly cleaning, assembly and sterilization. In this poster, we describe the advantages of Corning's newest vessel, the disposable spinner flask, which is designed to be single use with no assembly required. In this study, disposable spinner vessels were optimized using mammalian and insect cell lines. We assessed a variety of metabolic parameters as well as cell yield and viability under the various conditions. The performance of suspension cell cultures grown in disposable and glass spinner vessels were compared.

Corning Disposable Spinner Flasks:

Advantages:

- ❖ Gamma sterilized
- ❖ Double bagged for use in GMP conditions
- ❖ No need for cleaning or assembly
- ❖ Variety of tubing accessories available that can come assembled to vessel

Materials & Methods

Materials

Cells: Serum free adapted CHO-S (Gibco, part# 11619-012) and Sf9 (Gibco, part# 11496-015) cells were thawed and scaled up according to manufacturer's instructions.

Media: CHO-S cells were seeded into flasks containing CD CHO media (Gibco, part # 10743-029) supplemented with 1% HT solution (Gibco, part#11867-030) and 8mM L-glutamine (Mediatech, part# 25-005-CI). Sf9 cells were cultured in Sf-900 II SFM (Gibco, part# 10902-088).

Vessels: 1L Disposable spinner flasks (Corning, part# 3561) were used and compared to 1 L Glass spinner flasks (Corning, part# 4500-1L).

Methods

Spinner Flask Cultures: CHO-S cells were seeded into flasks at $2.5x10^5$ cells/ml and were incubated at 37°C and 5% CO_2. Sf9 cells were seeded into flasks at $1x10^6$ cells/ml and were incubated at 28°C in non humidified ambient air. Spinner flasks were placed on magnetic stir plates (Corning, SS4L slow speed, part# 440814), set to 60 rpm. Daily counts and metabolic samples were taken from each flask until cultures reached stationary phase (96 hours). Cell counts were done with a Z2 series coulter counter (Beckman Coulter) and viability was calculated by trypan blue exclusion. Metabolic samples were analyzed by the Nova Bioprofile® 400 (Nova Biomedical).

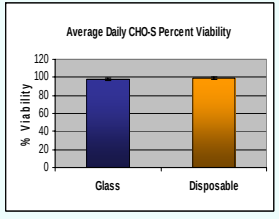

Figure 1. Average viability of CHO-S cultures taken daily (n=24)

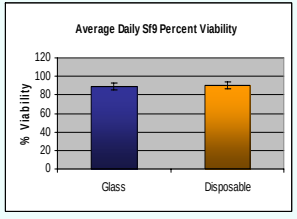

Figure 2. Average viability of Sf9 cultures taken daily (n=12 for glass and 16 for disposable)

Results

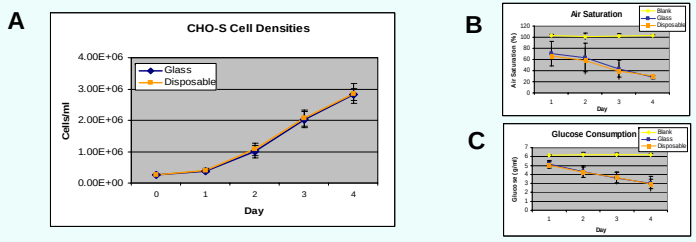

Figure 2: (A) 96 hour growth of CHO-S cells in Glass and Disposable 1L spinner flasks from 3 studies at 60rpm (n=6). (B) Air saturation of cultures taken over a 96 hour period. (C) Glucose consumption sampled over a 96 hour period

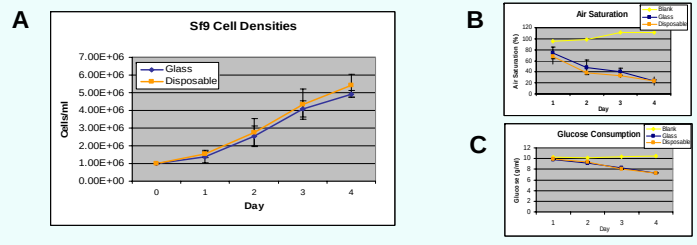

Figure 3: (A) 96 hour growth of Sf9 cells in Glass and Disposable 1L spinner flasks from 2 studies at 60rpm (n=3 for glass and 4 for disposable). (B) Air saturation of cultures taken over a 96 hour period. (C) Glucose consumption sampled over a 96 hour period

Conclusions:

- ➢ **Disposable large volume spinner flasks are comparable to conventional glass spinner flasks for cell growth and viability.**
- ➢ **Disposable spinner flasks attain equal aeration as compared to standard glass spinner flasks.**
- ➢ **Cells from glass and disposable spinner flasks are metabolically the same.**
- ➢ **A variety of cell types can be used in disposable spinner flask**