Microtiter miniature shaken bioreactor system as a scale-down model for process development of production of therapeutic alpha-interferon2b by recombinant Escherichia coli

ABSTRACT

Background: Demand for high-throughput bioprocessing has dramatically increased especially in the biopharmaceutical industry because the technologies are of vital importance to process optimization and media development. This can be efficiently boosted by using microtiter plate (MTP) cultivation setup embedded into an automated liquid-handling system. The objective of this study was to establish an automated microscale method for upstream and downstream bioprocessing of α-IFN2b production by recombinant Escherichia coli. The extraction performance of α-IFN2b by osmotic shock using two different systems, automated microscale platform and manual extraction in MTP was compared. Results: The amount of α-IFN2b extracted using automated microscale platform (49.2 μg/L) was comparable to manual osmotic shock method (48.8 μg/L), but the standard deviation was 2 times lower as compared to manual osmotic shock method. Fermentation parameters in MTP involving inoculum size, agitation speed, working volume and induction profiling revealed that the fermentation conditions for the highest production of α-IFN2b (85.5 μg/L) was attained at inoculum size of 8%, working volume of 40% and agitation speed of 1000 rpm with induction at 4 h after the inoculation. Conclusion: Although the findings at MTP scale did not show perfect scalable results as compared to shake flask culture, but microscale technique development would serve as a convenient and low-cost solution in process optimization for recombinant protein.

Keyword: Microscale; Automated system; α-interferon2b; Fermentation; Extraction