

Magma Diaphragm Pump: Compared to a Peristaltic Pump

To demonstrate the low shear performance of the diaphragm pump in the Magma Advanced Pumping System, compare three bioreactors containing Sf9 (*Spodoptera frugiperda*) insect cell cultures infected with a recombinant baculovirus from 48 - 96 hours post infection (during the decline phase of the culture). One with the culture recirculated through the Magma Advanced Pumping System diaphragm pump, one recirculated through a peristaltic pump, and one with no recirculation.

Figure 1. Bioreactor With Recirculation with Peristaltic Pump

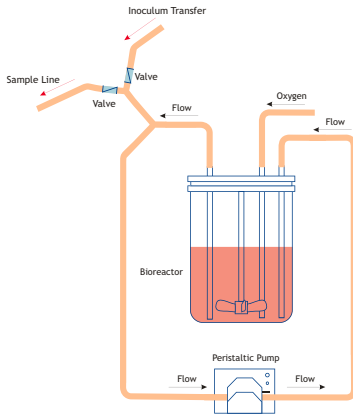
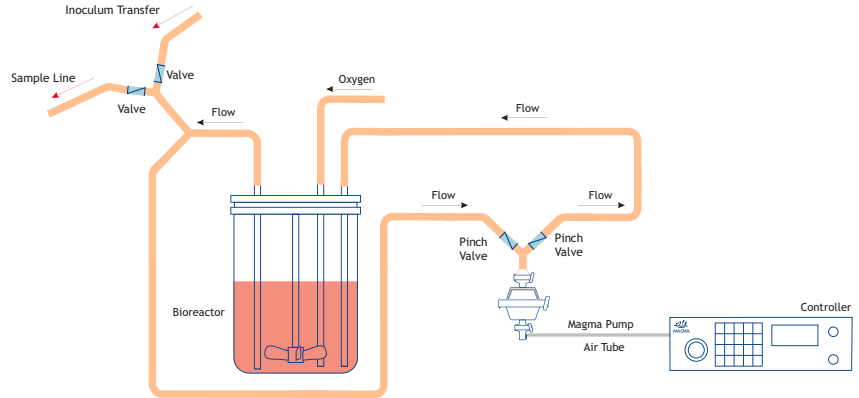


Figure 2. Bioreactor With Recirculation with the Magma Advanced Pumping System



Data: The total cell counts and viability were comparable between the control vessel (no recirculation) and the vessel with the Magma pump recirculating at a rate of 6 vessel volumes per hour. The average cell diameter in the culture pumped with Magma APS Pump with the recirculation tracked higher.

Figure 3. Total Cell Count in the Time Period 24-48 Hours Post-Infection

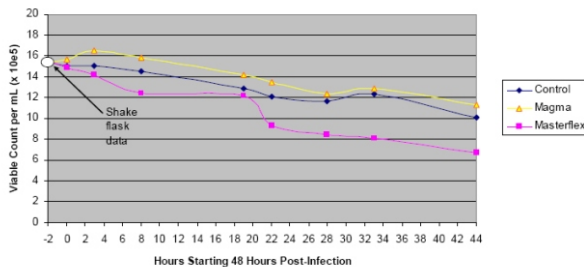


Figure 4. Average Cell Diameter in the Time Period 24-48 Hours Post-Infection

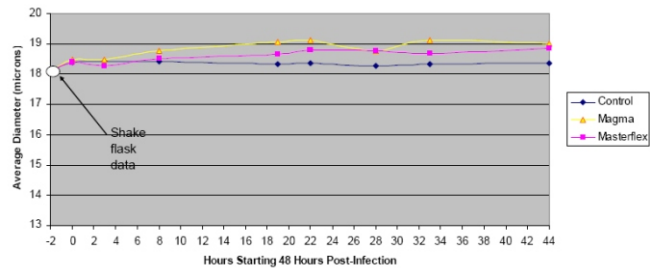
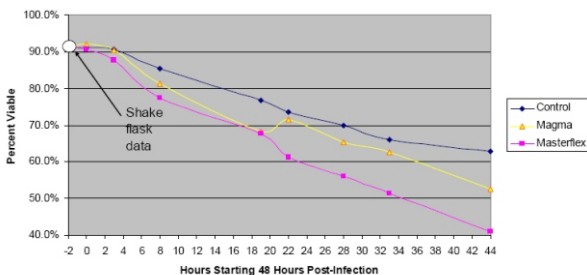


Figure 5. Cell Viability in the Time Period 24-48 Hours Post-Infection



Additional Experimental Information:

The bioreactors were autoclaved sterilized, and as shown in Figure 2, one with the Magma pump head with two check valves installed on a 5 foot length of 1/4 inch ID Pharmed tubing connected to vessel dip tubes on both ends. Each vessel was inoculated with two liters of cells from a shake flask that was infected with the baculovirus 24 hours earlier. The cultures in the bioreactors were temperature controlled at 27 °C and dissolved oxygen was controlled to a minimum set point of 50%. Recirculation of the culture with the Magma APS was commenced at 0.2 liters per minute (6 vessel volumes per hour). The Magma pump head was completing a full cycle every 16 seconds. Samples were immediately drawn from each vessel and tested on a Cedex AS20 analyzer. Subsequent samples were taken during the following 24 hour period.