

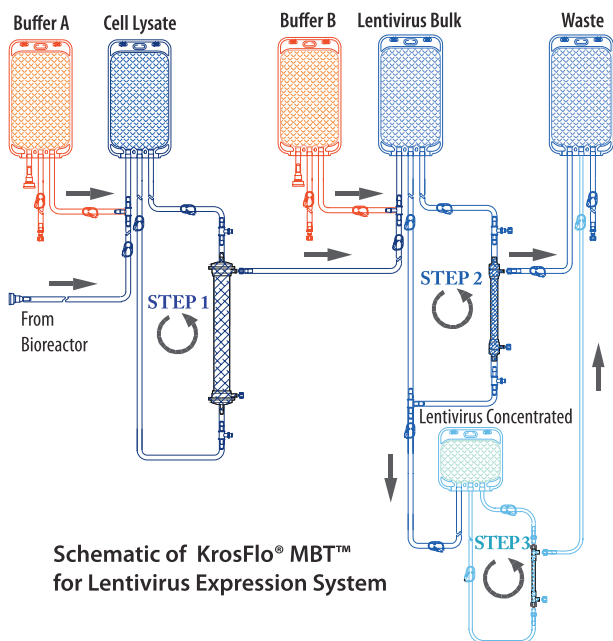
# Single-Use Solutions for Complex Processes



While industry is rapidly shifting from stainless steel vessels and hard-plumbed processes to single-use bioreactors and TFF filters, the transition between the multiple process steps remains complicated and time-consuming, often requiring fluid transfers, disrupting sterile barriers, and cleaning protocols. The simple solution to a complex process is connectivity: a continuous flow-path that interconnects all the process steps by means of a sterile single-use process manifold. Spectrum Laboratories incorporates process filters, reservoir bags, flexible tubing, and other critical elements into a custom-designed single-use KrosFlo MBT (Module-Bag-Tubing) system to provide total product isolation in a continuous flow-path and maintain a sterile barrier through multiple process steps. Alternatively, module-tubing sets can be designed for use with bags already validated.

## CUSTOM KROSFLO® MBT™ FOR SERIAL SEPARATION

A common complex process is serial separation in which sequential filtration steps are performed on a cascading process stream to isolate and purify a single batch component. A lentivirus harvest expression system is an application that greatly benefits from the use of a sterile, single-use MBT system. The diagram below shows each virus purification step represented by a different shade of blue to highlight the connectivity of this complex process by a single flow-path system.



## STEP 1: PRIMARY RECOVERY AND HARVEST

While the bioreactor serves as the feed source, a peristaltic pump draws the cells and lysate into the circulating microfiltration loop and drives macromolecules through the hollow-fiber membrane into a permeate bag (blue). After the bioreactor empties, the cells continue to concentrate. To increase product yield, the feed is then switched to a buffer source (orange) to perform a diafiltration. The dark blue section is then simply clamped-off and discarded.

## STEP 2: INITIAL CONCENTRATION AND PURIFICATION

Without disruption, the permeate bag from step 1 serves as the processing bag for the second process loop in which the virus is concentrated by a 20-nm (500 kD), 0.5-mm internal diameter (ID) membrane, and waste passes into a permeate bag. After reaching a desired concentration factor, a buffer source (orange) is then used to buffer exchange and purify the virus.

## STEP 3: FINAL VIRUS CONCENTRATION

Again without disruption, the virus is easily drained into a smaller collection bag that serves as the processing reservoir for final virus concentration in which the waste is directed to the permeate bag in step 2. Finally, the purified virus is collected in the process bag while the rest of the manifold is discarded.

## OPTIONAL: BUFFER, SAMPLING, AND RECOVERY

Supplemental bags can be included wherever needed for adding buffer, in-process sampling, or collecting product while maintaining a sterile barrier.

This single-use KrosFlo MBT System reduces total processing time from days to hours by creating continuous product isolation through multiple separation steps while eliminating process down-time, the need for sterile connections, and CIP/SIP procedures. Customers have also demonstrated that using custom-engineered MBT systems strongly promotes speed-to-market by reducing process development and validation time by one year. These obstacles may have been prohibitive in the past, but the simple solution to a complex process is a continuous single-use, sterile process flow-path system tailored to fit specific applications.

*Cassidy Markee is Director of Marketing, and Dave Serway is Director of Business Development at Spectrum Laboratories, Inc., 18617 Broadwick Street, Rancho Dominguez, CA 90220; 1-800-634-3300 or 1-310-885-4600; customerservice@spectrumlabs.com; www.spectrumlabs.com.*