

# COMPLETE SOLUTIONS FOR YOUR SPECIFIC EXOSOME WORKFLOW FROM PREPARATION TO ANALYSIS

Beckman Coulter provides solutions customized for each step in your specific exosome research workflow – from sample preparation to sample analysis – and can also help improve processes and assist with related challenges.

This chart provides a sample workflow and the solution for each step.

Sample Preparation	Specific Need	Solution
Prep Cell Culture Media	Easily centrifuge fetal bovine serum (FBS) at high speeds (typically overnight) to eliminate bovine exosomes from media.	<b>Ultracentrifuge</b>
Cell Culture	Quickly determine cell concentration and viability, eliminating variability inherent in manual counting methods.	<b>Vi-Cell**</b>
Exosome Isolation	Use differential centrifugation to remove cells, debris and large aggregates prior to density gradient isolation.	<b>Tabletop centrifuge</b>
Automated Density Gradient Layering	Minimize user to user variability and save time by automating density gradient set-up.	<b>Biomek workstation<sup>†</sup></b>
Exosome Purification by Density Gradient	Isolate exosomes from co-purified proteins and other vesicles.	<b>Ultracentrifuge &amp; Biomek workstation<sup>†</sup></b>
Exosome Concentration	Use ultracentrifugation to remove density gradient material and to concentrate exosomes.	<b>Tabletop ultracentrifuge</b>
Exosome Sizing	Measure size and zeta potential of purified exosomes.	<b>DelsaMax Pro/CORE<sup>†</sup></b>
NGS Library Construction and Sequencing	Convert exosomal RNA into libraries with a NEBNext Small RNA Library Preparation Kit or Illumina TruSeq Stranded mRNA kit automated on a Biomek workstation.	<b>Biomek workstation<sup>†</sup> &amp; automated NGS library preparation methods</b>
Population Characterization	Characterize and sort exosome-specific populations using scatter or fluorescence.	<b>CytoFlex Flow Cytometer<sup>†</sup> (Analysis)</b> <b>Astrios EQ (Sorting)</b>
Size Characterization	Use analytical ultracentrifugation (AUC) to get better size resolution and other properties of your exosomes.	<b>Optima AUC<sup>†</sup></b>

# Solutions for EXOSOME SAMPLE PREPARATION

## Floor Ultracentrifugation

For over 65 years, Beckman Coulter has been the global leader in ultracentrifugation. The **Optima XPN Series** is the premier ultracentrifuge, available in three configurations.

The versatile rotor library which includes swinging bucket (SW), fixed angle (FA), near vertical (NVT), vertical (VT), zonal and continuous flow rotors allow for various types of applications that require a high RCF - from pelleting to density gradient fractionation and more.

Among many other advantages, this series offers an intelligent user interface, networking and remote control capabilities, and is energy efficient.



## High Performance / High Capacity Centrifugation

The **Avanti JXN High Performance Series** of centrifuges includes the (4L) Avanti JXN-30 and the (6L) Avanti JXN-26 offer many advantages:

- Perfect for shared labs and GMP environment support. Password protection allows appropriate security levels.
- Flexibility with remote monitoring and control from your Apple® iOS and Android™ device with MobileFuge.
- Intuitive interface with large, user-friendly LCD screen.
- Detailed run history and rotor tracking by serial number.
- Backward compatibility with existing Avanti rotor library (please refer to the centrifuge User Guide for a list of compatible rotors).



# Solutions for EXOSOME SAMPLE PREPARATION



## Laboratory Automation†

The **Biomek 4000 Automated Workstation** helps overcome human variables and provides a consistent, reproducible, high-throughput method for gradient setup, representing a breakthrough solution to scale-up problems. From its flexibility to change volumes for each gradient and number of tubes, to a 24-position tube rack to hold thin-wall ultracentrifuge tubes and slow pipetting technique with liquid level sensing to minimize interface mixing of the gradient, the Biomek 4000 is an excellent solution to scale-up hurdles so you can conduct your research with ease and move your discovery forward.

For more information, visit [www.Biomek4k.com](http://www.Biomek4k.com)

## General Purpose Benchtop Centrifugation

The (120V) **Allegra X-14 Series Benchtop** centrifuges, available as refrigerated and constant temperature models, and the (208V) Allegra X-15R available as a refrigerated model, offer the optional ARIES (SX4750A) swinging bucket rotor which automatically detects and corrects an imbalance of up to 50 grams opposing loads, allowing you to complete the run without interruption.

The Allegra X-14R and Allegra X-15R have a powerful refrigeration system. The centrifuge pre-cools from room temperature to 4°C in less than 4 minutes preserving temperature sensitive samples.



## Tabletop Ultracentrifugation

The **Optima MAX-XP** tabletop ultracentrifuge features all the functionality and efficiency of our entry-level model, the Optima MAX-TL, plus offers additional advantages such as:

- Maximum RCF of 1,019,000 x g with the MLA 130 rotor.
- User ID/password protection.
- Rotor tracking by serial number.
- Remote monitoring and control option.
- Choose from a library of 17 rotors, among many other features.

# Solutions for EXOSOME SAMPLE ANALYSIS



## Cell Viability and Cell Concentration

The **Vi-CELL\*\* XR Cell Viability Analyzer** automates the process of determining cell concentration and viability, eliminating variabilities inherent in manual sample preparation and counting.

- Automatic and cost effective means to perform the trypan blue dye exclusion method.
- Automation improves the accuracy and repeatability of cell concentration measurements resulting in a more efficient exosome isolation process.

## Zeta Potential and Submicron Particle Size

The **DelsaMax Series†** is an advanced system for measuring size and zeta potential of exosomes. Research laboratories worldwide have benefitted from the highly accurate, fast, and reproducible results using the DelsaMax Series. The unique parallel design enables deep insight into exosome formation and function.



## Research Flow Cytometry

The ultra-sensitive **CytoFLEX+ Flow Cytometer** empowers your laboratory with an additional tool for the study of biological nanoparticles. With the ability to measure scatter from the 405nm violet laser, the system can easily measure particles as small as 200nm. With nanoparticle detection, in combination with analysis of additional biological markers using up to 12 fluorescent detectors, you'll discover more about molecular mechanisms of cellular interaction. To learn more visit [www.cytoflexflow.com](http://www.cytoflexflow.com)



## Native-condition Characterization

**Analytical Ultracentrifugation** provides a wealth of information to properly characterize proteins, oligomers, aggregates, particles, colloids and small structures. This powerful technology provides a method for determining molecular weight, size, shape, polydispersity, and even interactions between particles in a native, matrixfree environment. Interference optics deliver increased accuracy and the ability to examine a greater concentration range with a wider selection of samples.††

[info.beckmancoulter.com/workflowsolutions](http://info.beckmancoulter.com/workflowsolutions)

\*\* Vi-CELL is For Laboratory Use Only. Not for use in diagnostic procedures.

† DelsaMax, CytoFLEX, the Biomek Workstation, and the Optima AUC are For Research Use Only. Not for use in diagnostic procedures.

†† When compared to the absorbance optic system.

### References:

A Standardized, Automated Approach for Exosome Isolation and Characterization Using Beckman Coulter Instrumentation  
High-Performance Exosome Purification and Characterization via Density Gradient Ultracentrifugation and Dynamic Light Scattering



© 2016 Beckman Coulter, Inc. All rights reserved. Beckman Coulter, the stylized logo, and the Beckman Coulter product and service marks mentioned herein are trademarks or registered trademarks of Beckman Coulter, Inc. in the United States and other countries. CytoFLEX is a trademark of Xitogen Technologies (Suzhou), Inc., a Beckman Coulter company. Apple is a registered trademark of Apple, Inc. IOS is a trademark or registered trademark of Cisco in the U.S. and other countries and is used under license. Android is a trademark of Google, Inc.

For Beckman Coulter's worldwide office locations and phone numbers, please visit "Contact Us" at [beckman.com](http://beckman.com)  
MULTI-1913DS08.16