



# MasterClass

NORGEN BIOTEK

## Exosomes: The Essentials

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**Exosomes** are small extracellular vesicles that are released from cells throughout the body, and provide a method of intercellular communication. They carry a variety of cargo unique to the cell they are released from, including specific microRNAs, proteins and metabolites.

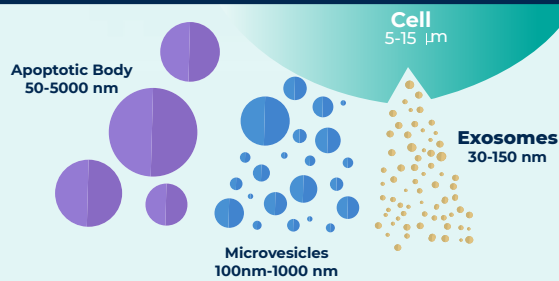
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**Exosomes** transit through the body in a variety of fluids, including **blood, saliva, breast milk, CSF, amniotic fluid, and urine**, before being taken up by specific recipient cells. By taking a sample of such fluids, researchers can isolate exosomes and look closer at what they are specifically carrying.

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How do **exosomes** know which cell to 'deliver' their messages to? Researchers are still studying the exact mechanisms by which target cells uptake exosomes. However, it is believed to involve interaction between the target cell and specific protein markers on the exosome's surface.

### Size Comparison



### Purification

There is no universal method for purifying exosomes from bodily fluids or culture media. While ultracentrifugation was once the traditional method, a variety of alternative methods are now available:



Method	Throughput	Purity	Time	Cost	Yield
Ultracentrifugation	Low	Med	Long	Med	Low
Polymer Precipitation	Med	Low	Long	Med	Low
Size Exclusion Chromatography	Med/Low	Med	Short	Med	Med
Immunoaffinity (Antibody)	Low	High	Med/Long	High	Med
Ultrafiltration	Med	Med	Med	Low	Med
Norgen - SiC	Med	High	Short	Med	High

### Methods

#### Exosomes can be purified using different methods

**Ultracentrifugation:** uses a specialized centrifuge to spin samples at extremely high speeds, separating exosomes from other particles based on their sedimentation rate

**Polymer Precipitation:** uses a polymer (i.e. PEG) to precipitate exosomes out of solution

**Size Exclusion Chromatography:** samples are passed through a column containing a stationary phase with a known pore size

**Immunoaffinity:** utilizes antigens to bind specific proteins on the exosome's surface

**Ultrafiltration:** sample is passed through a filter with a known molecular weight cutoff

**Silicon Carbide:** Norgen's patented resin, which binds exosomes under specific pH conditions

### Analysis

Once we have purified exosomes, we need tools to analyze what they look like and what they contain. Some common methods include:



**Transmission Electron Microscopy (TEM)**  
visualize exosome **morphology**

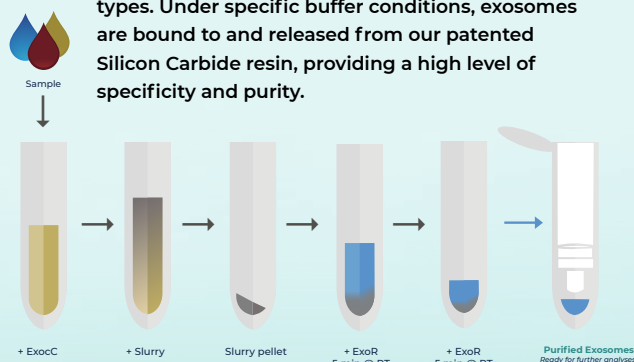


**RNA Extraction & Next Generation Sequencing:**  
determine the species of **RNA** present inside the exosome



**Mass Spectrometry:**  
identify and characterize **proteins** on and within exosomes

**Norgen** provides a quick and easy method of exosome purification from a variety of sample types. Under specific buffer conditions, exosomes are bound to and released from our patented Silicon Carbide resin, providing a high level of specificity and purity.



### Downstream Applications

**Disease Monitoring-** By analyzing the cargo found inside exosomes, we can establish biomarkers to help monitor disease development, progression and treatment impact



**Cosmetics-** Exosomes are making a name in the dermatological and cosmetic industries, from potential use in topical wound healing to skin and hair rejuvenation

**Drug Delivery -** because of exosomes' natural occurrence in the body, cell specificity, and ability to cross biological barriers, exosomes show promise as a novel drug delivery system

