



spinSIGHTS

from the lab



In this issue: Ultracentrifugation is preferred for high-purity EV isolation

Issue: 010

Why should I choose ultracentrifugation as the preferred method for extracellular vesicle purification?

EVs, most notably exosomes, have shown tremendous promise as biomarkers and therapeutics. However, many of the available techniques for EV purification generate broad populations of vesicles that are unsuitable for subsequent characterization and application. Ultracentrifugation (UC) is broadly considered the gold standard for EV purification due to its capacity to reproducibly isolate specific subpopulations of EVs.¹

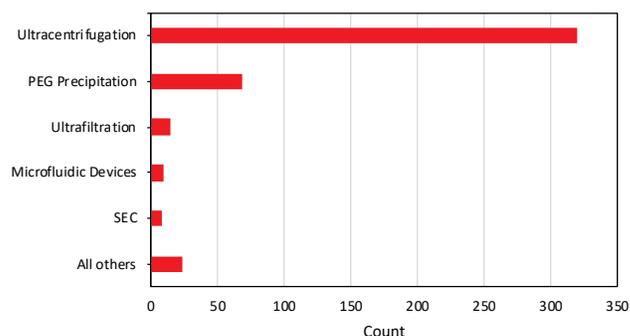
Senior Field Applications Scientist
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EV Purification with UC

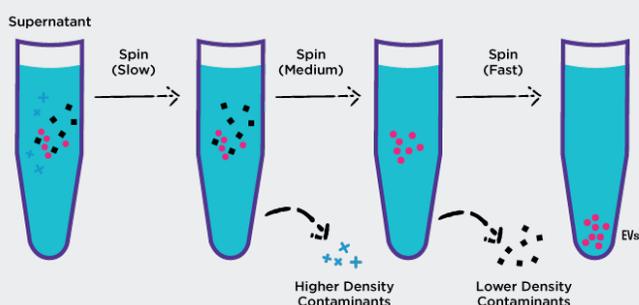
UC affords exceptional reliability

EVs are heterogenous with respect to size, composition, and function. This variation represents a fundamental challenge for EV research, as accurate analysis of physical and functional characteristics of EV populations necessitates selective and reliable purification. Due to the multitude of advantages UC offers, it is the most commonly used technique for EV purification.²



Distribution of original research papers on EV purification. Figure reproduced from data reported by Konoshenko et al.²

Differential ultracentrifugation (DUC):



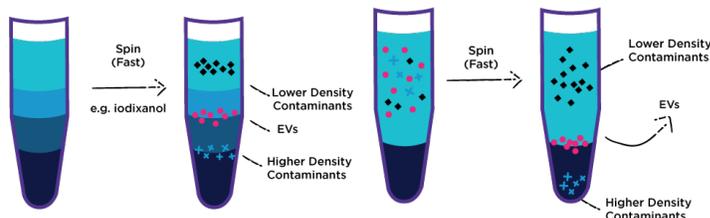
Simple purification using Differential UC

Simple but efficient, differential UC (DUC) relies on multiple rounds of centrifugation to selectively eliminate contaminants and pellet EVs.³ The principal advantages of DUC are minimal hands-on time, high throughput, high yield, and low per-sample cost. Additionally, DUC is suitable for a range of EV purification workflows from numerous small samples to multi-liter batches.

Reach higher purity with density modifiers

For high purity EV preparations, density modifiers such as sucrose and iodixanol are commonly utilized. Density cushion UC (DCUC) relies on gently pelleting EVs onto a 'cushion' of density material,⁴ while density gradient UC (DGUC) employs a medium of graded density material to separate EV subpopulations based on their buoyant densities.⁵ When EV purity is a top priority, density-based separations are essential.

Density gradient ultracentrifugation (DGUC): Density cushion ultracentrifugation (DCUC):



Summary

Ultracentrifugation possesses several distinct advantages and is currently the most widely used method for EV purification. Moreover, UC as a platform is broadly suitable for a variety of EV applications. Learn more about how UC can enhance your EV workflow at www.beckman.com/resources/sample-type/extracellular-vesicles

1 Saenz-Cuesta, et al. (2015). Front Immunol, 6, 50. DOI: 10.3389/fimmu.2015.00050

2 Konoshenko, et al. (2018). Biomed Res Int, 8545347. DOI: 10.1155/2018/8545347

3 Sharma, et al. (2020). Sci Rep, 10, 13327. DOI: 10.1038/s41598-020-70245-1

4 Duong et al. (2019). PLoS One, 15, e0215324. DOI: 10.1371/journal.pone.0236914

5 Van de Vlekkert et al. (2020). 10, e3576 DOI: 10.21769/BioProtoc.3576



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