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Materials, methods and sampling devices for preserving and extracting extracellular vesicles in biofluids

Drop-on-demand printed microtablets with customizable dose and release for pediatrics and beyond.

Researchers at Purdue University have developed a microsampling device for preserving and extracting extracellular vesicles in biofluids. Extracellular vesicles (EVs) are present in whole blood and because they include characteristics of original cells, e.g., blood cells, are useful for diagnosing diseases such as cancer, neurogenerative diseases, genetic disorders and drug metabolism. There is a strong global market for EV diagnostics and therapeutics which is estimated to increase from $227.5 million in 2023 to $1.3 billion by 2028.

The current methods that are employed to isolate extracellular vesicles found in biofluids, such as using an ultracentrifuge, are complicated and costly. Additionally, the conventional practice of collecting biofluid (venipuncture) is inferior to using a microsampling device. This invention allows transferring dried whole blood for on-site and off-site isolation of EVs from the remaining bodies in the dried biofluid while being less invasive, lower cost, and requiring less specialized medical equipment and training than venipuncture. This technology provides easy instructions for self-sampling and minimizes the pain and inconvenience for usage. It also paves the new way of Laboratory Developed Test (LDT) and medical diagnostics.

Technology Validation:

The successful preservation of EVs under dry conditions was demonstrated. Additionally, dried blood EV microsampling device obtained EV protein signals with less contamination.

Advantages:

-Easy to operate

Technology ID

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Category

Pharmaceuticals/Pharmaceutical Packaging & Delivery Systems
Pharmaceuticals/Computational Drug Delivery & Nanomedicine
Chemicals & Advanced Materials/Materials Processing & Manufacturing Technologies

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-Minimize pain and inconvenience

-Can be done without medical professionals

-Less invasive sample collection

-Sample collection can be done without specialized medical equipment

-Sampling can be done outside the hospital or at home.

Applications:

-Blood sampling

-Self-sampling

-Biobank sample storage

-Laboratory Developed Test (LDT)

-Prognosis and monitoring

-Healthcare in remote areas, underdeveloped regions, and diverse populations

TRL: Medical/Health

Intellectual Property:

Provisional-Patent, 2024-07-30, United States

Utility Patent, 2025-07-28, United States

Keywords: Biotechnology, Blood, Diagnostics, Medical/Health, saliva, sampling device, self-sampling, urine