INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

# Chiroptical Detection and Mutation Analysis of Cancer-Associated Extracellular Vesicles in Microfluidic Devices

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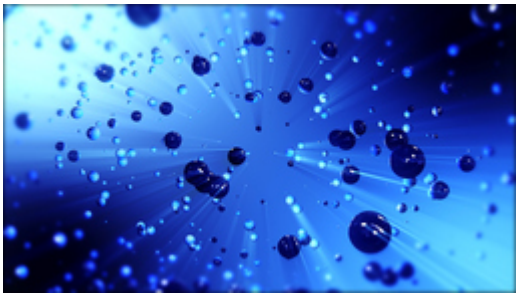

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## OVERVIEW

A liquid biopsy to rapidly and inexpensively detect tumor-produced exosomes

- Detects exosomes by assembling layers of chiral gold nanoparticles onto a microfluidic device
- May aid cancer detection and provide guidance for treatment

## BACKGROUND

Exosomes are nanosized particles produced by most cells in the human body to facilitate intracellular communication. Tumor-derived exosomes are known to promote cancer cell growth, to foster the formation of metastases, and to regulate drug resistance to antineoplastic agents. The presence of novel exosomes in the blood stream can therefore potentially serve as a marker to aid the diagnosis of cancer. Within this rapidly emerging family of biomarkers for cancer detection are cancer-cell secreted nanoscale small extracellular vesicles (sEVs). The existing methodologies used to profile sEVs require complex technologies and protocols, limiting their timeliness and therefore their usefulness.

## INNOVATION

Researchers at the University of Michigan have developed a method to rapidly isolate and detect cancer-associated exosomes through liquid biopsy of blood plasma. The process detects exosomes by using their affinity to Annexin IV and assembling layers of chiral gold nanoparticles onto a microfluidic device. This methodology improves sensitivity and timeliness of detection by an order of magnitude compared to traditional techniques. It also provides a low-cost glass or plastic-based means by which to use microfluidics to profile various extracellular vesicles. From a clinical standpoint, exosomes from lung cancer patients can be distinguished from those in

healthy donors by evaluating chiroptical spectroscopic signatures of bimolecular components of exosomes enhanced by chiral plasmic nanoparticles. Additionally, the test was able to characterize a mutation of the epidermal growth factor receptor, suggesting the ability to predict tumor responsiveness to newer, targeted therapies.