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# Scientists develop 'CATCHER' for crucial biomarkers

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Tiny genetic markers, circulating in the blood, have shown great promise in diagnosing and treating disease. Yet identifying and harvesting these extracellular vesicles (EVs) have been a major challenge for science.

Now a laboratory at the Hackensack Meridian Center for Discovery and Innovation (CDI) has discovered a highly sensitive methodology that can efficiently find and harness EVs—particularly exosomes and the micro RNAs they carry. These could be crucial clues to identifying diseases such as cancer early on in its development.

The scientists have now unveiled the Extracellular Vesicle Capture by AnTibody of CHoice and 1 Enzymatic Release, or EV-CATCHER, in the *Journal of Extracellular Vesicles*.

"We are establishing the threshold of detection," said Olivier Loudig, Ph.D., an associate member of the CDI. "The EV-CATCHER is really intended to push the envelope."

"This work shows us a new dimension to the study of circulating and exhaled biomarkers," said David Perlin, Ph.D., the chief scientific officer and senior vice president of the CDI. "The Loudig laboratory is elevating the field with this novel work which has great promise."

The EV-CATCHER was designed by Loudig as a high-throughput test to find and quantify tiny amounts of micro RNAs detected through next-generation sequencing. The technology uses targeted antibodies to bind

to the molecules in plasma. It was developed after Loudig and his team tested 11 other methodologies, including magnetic beads, which were found to be inexact.

Testing the EV-CATCHER involved taking mouse-derived extracellular EVs that were spiked into human plasma. The results showed the EV-CATCHER caught the mouse-derived material—and the researchers were able to successfully extract the intact micro RNAs within.

Other analyses assessed samples from COVID-19 patients.

The first comparison used sequences from samples purified with the EV-CATCHER, in contrast to whole-serum samples. Loudig and his team were able to show which exosomes were hallmarks of hospitalized patients with serious disease, and which showed up in more moderate cases.

Separately, a test on convalescent plasma of recovered COVID-19 patients showed that high levels of anti-spike IgG antibodies demonstrated neutralizing properties against the SARS-CoV-2 virus, in vitro.

Furthermore, the testing showed that the COVID-19 patients' exosomes themselves had neutralizing properties on the virus—meaning it could have therapeutic value in convalescent plasma, and other potential treatments of the future.

"This paper demonstrates that the technology not only helps us detect and diagnose disease in its early stages—it can also potentially be used to help treat disease, as well," said Megan Mitchell, Ph.D., a postdoctoral research fellow in the Loudig lab, and a co-author of the paper.

**More information:** Megan I. Mitchell et al, Extracellular Vesicle

Capture by AnTibody of CHoice and Enzymatic Release (EV-CATCHER): A customizable purification assay designed for small-RNA biomarker identification and evaluation of circulating small-EVs, *Journal of Extracellular Vesicles* (2021). DOI: 10.1002/jev2.12110