

Scientists develop liquid biopsy technique to help detect cancer in blood

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University of Central Florida College of Medicine researchers have found a new way to track metastatic cancer cells in the body, which in the future could help identify cancer earlier and give patients more treatment options.

In the latest issue of *PLOS ONE*, Professor Annette Khaled's research lab reported using a protein complex called a chaperonin as a new marker for [cancer](#) cells in [blood](#)—that provides a clearer indication of spreading cancer. By using the new marker, UCF scientists were able to detect more cancer cells in the blood, a procedure called liquid biopsy, which could help patients suffering from breast and lung cancers better monitor their disease.

Cancer cells need a lot of proteins to survive and travel through the body. The chaperonin complex lets proteins fold into functional, three-dimensional shapes. Without the complex, important proteins needed by cancer cells can't form. All cells contain the chaperonin complex. But cancer cells have significantly higher levels, because as Khaled says, "Cancer cells are hungry for protein."

In the past few years, Khaled identified the chaperonin complex as a significant indicator of a cancer's severity and has developed nanoparticle-based therapies to seek out the chaperonin complex in cancer cells and destroy it. Without this protein-folding mechanism, cancer cells starve and die.

"The more chaperonin complex, the more advanced the cancer," Khaled says. "By using the chaperonin complex to detect cancer cells in blood, we get a warning that the cancer may be spreading. Using the chaperonin complex to detect cancer cells in blood is a unique solution for a non-invasive diagnosis."

Markers to identify cancer cells in blood are commonly based on epithelial features in cells that line surfaces of the body from which cancers arise. But such markers to detect cancer cells in blood are fairly "generic and provide little information about the cancer itself," Khaled says. Cancer cells that are shed into blood can come from any part of the tumor and don't survive past a few hours. So, using a marker like the

chaperonin complex that identifies dangerous cancer cells circulating in blood could alert doctors that a patient is relapsing or not responding to treatments.

Khaled is head of the College of Medicine's Division of Cancer Research. Her study began by using blood and tissues from metastatic breast cancer patients being treated at Orlando Health's UF Cancer Center to test whether the chaperonin complex was better than traditional markers to identify cancer cells in blood. Then with blood from lung cancer patients, she validated this idea and found that using the chaperonin complex detected more lung cancer cells compared to standard methods for [liquid biopsy](#).

The UCF research team used the FDA-approved CELLSEARCH System, which was purchased thanks to a generous donation from the Catherine McCaw-Engelman and Family Cancer Research Collaborative Fund, set up to honor a Winter Park, Florida, woman who died of colon cancer that was not detected until it had spread. The equipment can isolate, photograph and count [cancer cells](#) from a single tube of blood and was adapted for detection of the chaperonin complex in blood cells.

More information: Amanda Cox et al, Chaperonin containing TCP1 as a marker for identification of circulating tumor cells in blood, *PLOS ONE* (2022). [DOI: 10.1371/journal.pone.0264651](https://doi.org/10.1371/journal.pone.0264651)

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