New toolbox for urological cancer detection

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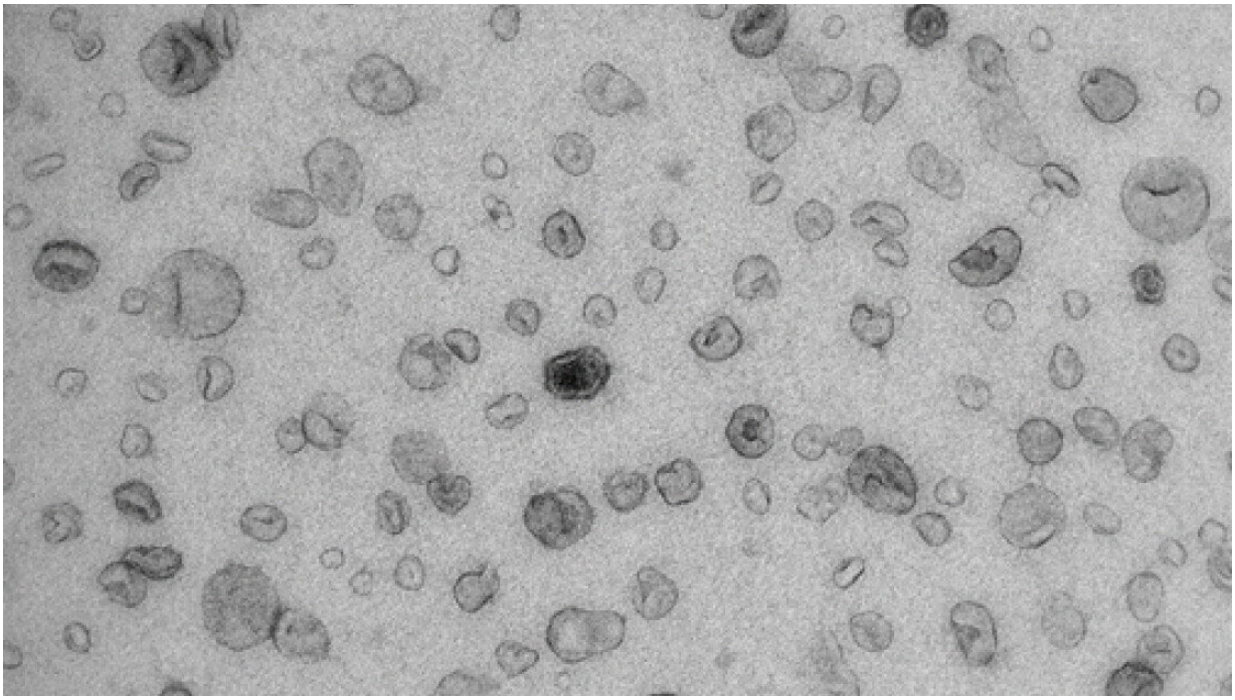

Electron microscopy image of the urinary extracellular vesicles studied. Credit: University of Turku

Researchers from Ghent University, Belgium, together with researchers from the University of Turku, Finland, have developed a new method for biomarker discovery of urological cancers. The method enables timely diagnosis and treatment of cancer. Urological cancers include e.g. prostate, bladder and kidney cancers.

Biomarkers are biological signatures in the body that can indicate the presence of cancer. A promising source of new biomarkers are extracellular vesicles. These are microscopic vesicles that are released by cancer cells into biological fluids, such as urine.

"Detecting and examining these vesicles in urine has an enormous potential for developing new tests for early detection of urological cancers. However, research related to this is still in its infancy," says Bert Dhondt from Ghent University.

To date, no sufficiently effective method exists for separating extracellular vesicles from urine. Such method would be essential for investigating these vesicles and using them in patient diagnostics and treatment. This means that extensive laboratory research into these promising biomarkers has not yet been translated into new urine tests which can help patients. The recently published study addresses this problem in several ways.

New Toolbox Helps Mapping the Composition of Extracellular Vesicles

Researchers concluded that the currently used methods for separating extracellular vesicles from urine are not optimal for detecting new cancer biomarkers. Therefore, they developed a new toolbox to map the composition of urinary extracellular vesicles.

This toolbox consists of a novel method, developed at Ghent University, to separate extracellular vesicles from urine with high purity. In addition, researchers at the University of Turku were involved in developing a method for determining the protein composition of the vesicles.

"We have the know-how and the world's top equipment here at the

University of Turku for determining the protein composition of biological samples, whereas the researchers at Ghent University represent the very top in extracellular vesicle research. Therefore, the distribution of work was very clear from the beginning," says Docent Pekka Rappu from the Department of Biochemistry at the University of Turku.

Researchers applied this new method to urine samples from patients with prostate, bladder and kidney cancer. They established that extracellular vesicles in urine carry protein signatures specific to the various urological cancers. Using this new toolbox, the researchers were also able to map the protein composition of urinary extracellular vesicles in unprecedented detail.

Extracellular vesicles are increasingly being recognized as promising cancer biomarkers. Thanks to this recent research, scientists now have access to a new toolbox that brings us one step closer to the development of promising new urine tests.

"In the future, the results of the study can aid patients with urological cancers through faster diagnosis and timely treatment," says Bert Dhondt.

More information: Bert Dhondt et al. Unravelling the proteomic landscape of extracellular vesicles in prostate cancer by density-based fractionation of urine, *Journal of Extracellular Vesicles* (2020). DOI: 10.1080/20013078.2020.1736935

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