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# Technology description

**Nanofabricated liquid biopsy test for prostate cancer**

Prostate cancer is the most common cancer among men above an age of 55. In the Netherlands, the number of prostate cancer related deaths exceeded 3000 in 2020 and is expected to increase with 32% in the upcoming 20 years.[[1]](#footnote-2) To minimize deaths related to prostate cancer, early detection on a wider scale is considered crucial.

The early detection of cancer has been improved by recent developments in liquid biopsy tests – nanosensors which can detect cancer-specific biomarkers at low volumes in a drop of blood.[[2]](#footnote-3) The NIPA technology (Nanoelectrodes for Individual Particle Analysis), as shown in the figure below, is especially promising.[[3]](#footnote-4) The binding of single cancer-specific biomarkers on nanoelectrodes results into a high specificity and sensitivity of the test.[[4]](#footnote-5) Because of this increased accuracy, the test significantly improves early-stage prostate cancer detection.

Large scale application of this test for early detection bears several risks. Over-diagnosis, due to the high accuracy of the liquid biopsy test, becomes a serious possibility. In this situation, cancers which would not develop symptoms or become a serious health threat are detected and could lead to unnecessary treatment, including its side-effects (also called over-treatment). Additional concerns have been raised about the impact of a screening program on the capacity of the health care system and the (environmental) risks and responsibilities of large-scale production and wide dissemination of the test.

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1. [International agency for research on cancer, *The Netherlands*](https://gco.iarc.fr/today/data/factsheets/populations/528-the-netherlands-fact-sheets.pdf) [↑](#footnote-ref-2)
2. [Knuever et al., *The use of circulating cell-free tumor DNA in routine diagnostics of metastatic melanoma patients*, Nature, 2020](https://www.nature.com/articles/s41598-020-61818-1.pdf) [↑](#footnote-ref-3)
3. [Mathew et al., Electrochemical Detection of Tumor-Derived Extracellular Vesicles on Nanointerdigitated Electrodes, NanoLetters, 2020](https://pubs.acs.org/doi/pdf/10.1021/acs.nanolett.9b02741) [↑](#footnote-ref-4)
4. *Specificity* concerns the ability of a test to indicate one (group of) diseases without returning a positive result at the presence of other molecules. *Sensitivity* is the ability of a sensor to indicate low concentrations of the target molecule. [↑](#footnote-ref-5)