

'Nanogap' for early detection of bladder and kidney cancer

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A new mobile device that allows bladder and kidney cancer to be detected at an early stage. This is being worked on by Wilfred van der Wiel, professor of nanoelectronics at the University of Twente MESA+ research institute. Thanks to this method, it is possible to read from DNA cells whether their carrier has bladder or kidney cancer.

Van der Wiel recently received an ERC 'Proof of Concept' grant for his idea. This will enable him to translate this basic research into a (commercial) application. The grant (150,000 EUR) is intended for researchers who have previously received a grant from the European Research Council (ERC) and in this way can go through the pre-commercialization phase of a product, such as applying for patents or setting up a business.

Nanogap sensor

Van der Wiel calls his idea the 'NanoGap sensor', a gap about 100 nanometres wide (a nanometre is a million times smaller than a millimetre) in an electrode (precious metal) with receptors that raise an alarm in the case of degraded DNA. He focuses specifically on DNA in urine, from which it is possible to 'read' whether there is any indication of early-stage bladder, kidney and, in women, [cervical cancer](#).

"In the current situation we only detect [cancer](#) at an advanced stage, when the patient already has symptoms, for example associated with a

tumour", says Van der Wiel. "In this study we look for DNA where something has changed, i.e. DNA that is covered by the body with methyl groups. In many cancers excessive methylation of the DNA occurs; this is referred to as hypermethylation. Although medical science does not yet know whether hypermethylation always signifies cancer and in what form, a clear link has been shown."

In Van der Wiels' NanoGap Sensor, the hypermethylated DNA is bound to receptors on both sides of the gap. By covering the DNA with metal particles, a live wire on a nanoscale is created that results in a short-circuit and a detectable signal.

Zilveren Kruis: Half a million euros for research

With the NanoGap sensor, Van der Wiel and his team aim to detect hypermethylated DNA molecules in an accessible manner. The research is being performed in a wide consortium of research groups at the University of Twente MESA+ [research institute](#) (BIOS, IMS, NE departments), directed towards the development of nanosensors for the early detection of cancer. Cooperation has been established with the VUmc and health insurer Zilveren Kruis. Zilveren Kruis recently announced that it will continue to support the research with more than half a million euros for the coming year.

Provided by University of Twente

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