Remco de Kock, PhD

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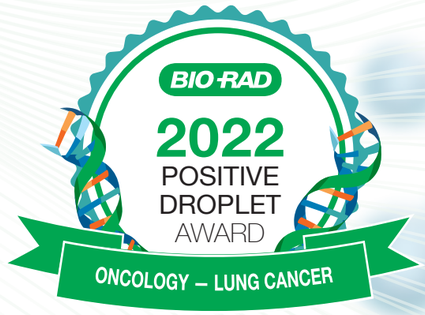
Category: Oncology — Lung Cancer



About Dr. Remco de Kock

Dr. Remco de Kock worked on the development and implementation of multiplex Droplet Digital™ PCR (ddPCR™) assays for the detection of the most relevant driver and therapy resistance mutations in circulating tumor DNA (ctDNA) to support the diagnosis and therapy response monitoring of lung cancer in routine clinical practice. His research originates from a collaboration between the Catharina Hospital Eindhoven, Máxima Medical Center, and the Eindhoven University of Technology.

Dr. Remco de Kock's Key Publications

- Optimized (Pre) analytical conditions and workflow for droplet digital PCR analysis of cell-free DNA from patients with suspected lung carcinoma
- Therapy monitoring of EGFR-positive non–small-cell lung cancer patients using ddPCR multiplex assays
- Circulating biomarkers for monitoring therapy response and detection of disease progression in lung cancer patients

Impact of Droplet Digital PCR on Dr. Remco de Kock's Research

Our research focused on the development and implementation of multiplex ddPCR assays for the detection of the most relevant mutations in ctDNA to assess the clinical added value of ctDNA analysis in diagnosis, therapy selection, and therapy response monitoring of patients with lung cancer in routine clinical practice.

The detection of ctDNA in blood is challenging, due to its low concentration and interference of genomic wild-type DNA caused by disruption of leukocytes. Therefore, ctDNA analysis requires an optimal preanalytic workflow and sensitive analytical techniques, such as Droplet Digital PCR. Key features of this technique that greatly impacted our research are absolute quantification of nucleic acids and higher order multiplexing.

We used the concentration of wild-type cell-free DNA as validity criterion to monitor the quality of the cell-free DNA isolation and to guarantee reliable calculation of the fractional abundance. In addition, the detection limit of Droplet Digital PCR depends on the amount of input DNA and the precision depends on the number of generated droplets. These properties can be monitored and controlled, making Droplet Digital PCR a reliable and reproducible technique for ctDNA analysis in daily practice.

For serial ctDNA measurements, the calculated concentrations and their confidence intervals can be used to determine if the concentration changes significantly over time. This property had a great impact on our research, as we were able to correlate ctDNA concentration change with response to therapy. Based on these results, a strategy based on ctDNA analysis by Droplet Digital PCR for therapy response monitoring is proposed that can potentially detect progressive disease earlier.

In our research, we used higher order multiplexing to detect up to five mutations simultaneously. In this way, scarce patient material can be used efficiently. Based on our study population, the most relevant actionable driver mutations for lung cancer can be detected using our assays. A novel diagnostic strategy is proposed in which ctDNA analysis by Droplet Digital PCR is used for initial screening to select patients for mutation analysis on tumor tissue. Using this approach, overall costs of tumor profiling could be reduced, and enables more patients with lung cancer to benefit from innovative molecular diagnostics and accompanying targeted therapies.