

## An Electrokinetic device for Isolation and PCR detection of Cancer related DNA Biomarkers directly from whole blood “Seamless Sample to Answer”

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A new electrokinetic device has been developed which allows cell free circulating (cfc) DNA and other biomarkers to be rapidly isolated directly from whole blood. Cfc-DNA and other cellular nanoparticulates (cfc-RNA, mitochondria, cell fragments, etc.) represent an important class of biomarkers for early detection of cancer and other diseases. Unfortunately, because cfc-DNA isolation is complex, time consuming and expensive these biomarkers have not translated into viable diagnostics. Using new electrokinetic devices at AC frequencies in 3000Hz-10,000Hz range and 10 volts peak-to-peak, causes the separation of blood cells into DEP low field regions and cfc-DNA into DEP high field regions. A simple fluidic wash then preferentially removes the blood cells, while the cfc-DNA biomarkers remain concentrated on the microelectrodes. In previous work, the isolated cfc-DNA was removed from the electrokinetic device and then analyzed by PCR or other genotyping techniques. Now, new techniques and devices have been developed which allow the PCR reactions to be carried out in-situ (in the same chamber). This eliminates the loss of DNA that normally occurs in sample transfer processing. Overall, this work sets the stage for a new generation of “seamless” sample to answer diagnostics for early detection of cancer and other diseases.

### Biography

Michael J. Heller received his Ph.D. in Biochemistry from Colorado State University in 1973. He was an NIH Postdoctoral Fellow at Northwestern University from 1973-1976. Dr. Heller was supervisor of the DNA Technology Group at Amoco Corporation from 1976-1984; Director of Molecular Biology at Molecular Biosystems, Inc., from 1984-1987; a co-founder of Integrated DNA Technologies and President/COO from 1987-1989; and a co-founder of Nanotronics and Nanogen and Chief Technical Officer from 1993-2001. Dr. Heller is now a Professor in the Departments of Nanoengineering and Bioengineering at the University California San Diego, and recently co-founded a new company called Biological Dynamics.

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