

# RainDance: RainDrop™ Digital PCR System

The RainDrop™ Digital PCR System detects minute amounts of mutated DNA within a single blood sample, providing the potential for much earlier detection of tumors throughout the body.

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## 01. Challenge

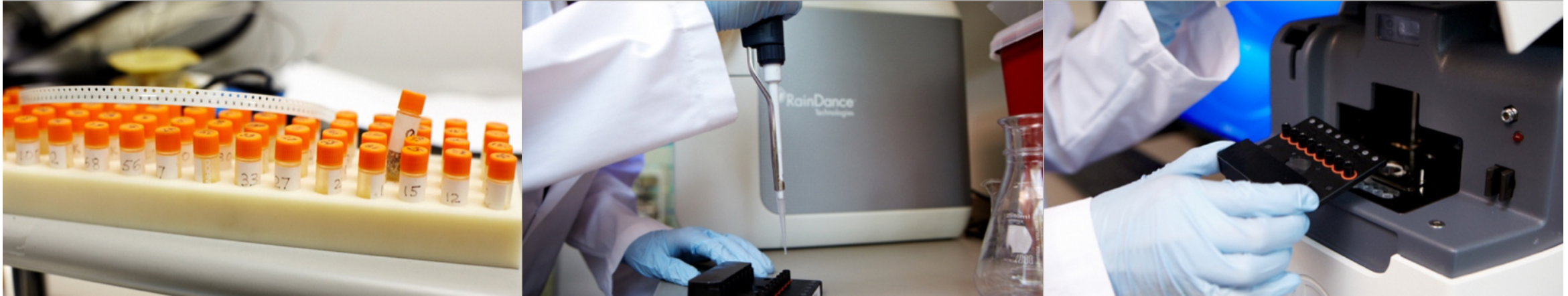
Since the 1980s, molecular biologists and researchers have used a technology called Polymerase Chain Reaction (PCR) to perform a variety of genetic tests, including analysis of biopsies to test for cancer.

In 2011, RainDance Technologies approached Continuum with a picodroplet platform that could enable researchers to perform a highly sensitive form of digital PCR. Early in the program, Raindance had demonstrated the fundamentals of the technology. The next objective: Bring this technology to market as a cost-effective, easy-to-use bench-top system.



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## 02. Research & Insights



### FROM ONE TO TEN MILLION

EPAM Continuum applied a number of engineering methods, including an aerospace technique for routing oil in aircraft engines, to develop a device that breaks down a single drop of blood into 10 million microscopic droplets. DNA strands in each droplet are examined individually, using a laser-based detector, for mutations.

### MINISCULE IN SIZE AND EXCEPTIONAL IN SPEED

The digital PCR device generates microscopic droplets at a rate of 10,000 per second—a feature made possible by high-speed digital signal processing hardware and firmware developed by our team.

### BORROWED TECHNOLOGIES FOR BETTER SOLUTIONS

Our team created a precise positioning system to read each droplet, employing the same technology a DVD or BluRay player uses to read discs. In fact, Sony manufactures the chip component.

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## 03. Solution

Together, EPAM Continuum and RainDance Technologies developed the RainDrop™ Digital PCR System—the most sensitive bench-top bio-detector on the market today. A breakthrough in cancer research, it can detect multiple mutations within a single DNA sample, providing great insight into the mutations associated with the disease.

# 10M

**THE PROJECT TEAM DREW UPON AN AEROSPACE TECHNIQUE FOR ROUTING OIL IN AIRCRAFT ENGINES, TO DEVELOP A DEVICE THAT COULD BREAK DOWN A SINGLE DROP OF HUMAN BLOOD INTO 10 MILLION MICROSCOPIC DROPLETS.**

Each droplet contains a single DNA strand, which is then examined individually for mutations using a laser-based detector.



## RainDance: RainDrop™ Digital PCR System

Research institutions around the world use the RainDrop System to advance scientific understanding of cancer and search for a possible cure. To date, RainDance has shipped over 100 RainDrop instruments.

This device has the potential to help on the clinical side of the fight against cancer as well, though it has not yet been approved for medical use. Digital PCR could deliver on the promise of a “liquid biopsy”—meaning that doctors could test for the existence of cancer cells anywhere in the body with only a blood sample, as opposed to extracting a tissue sample from a suspected tumor.

## 04. Results

