

Top 10 Innovations 2015

The newest life-science products making waves in labs and clinics

This year's installment of The Scientist's annual Top 10 Innovations competition highlights a mixture of basic research and clinical tools.

Our expert panel of independent judges selected sequencers, reagent kits, genome-editing methods, and other technologies that could have huge impacts on science and medicine alike.

Liquid biopsy is an attractive, minimally invasive option for tracking cancers in the body. Analysis of circulating tumor cells (CTCs) in the blood can offer a complete picture of protein, DNA, and RNA activity—but locating rare CTCs in blood samples is often challenging. The Celsee PREP400 sample-preparation system, on the market in early 2015, is an automated instrument that physically separates CTCs from a blood sample. It uses specialized slides to take advantage of microfluidic dynamics, allowing cells of a certain size to flow through channels and capturing others in single wells without altering their internal chemistry. “You can process large volumes of blood, and you do not have to do any preprocessing,” says Kalyan Handique, president and CEO of Celsee Diagnostics. “You just add our buffer and run it through the slide.”

Once the live CTCs are captured in individual wells on the plates, the Celsee PREP400 can stain them for a variety of molecular analyses, and the companion Celsee ANALYZER captures images of single cells from the slides for rapid review. Paolo Fortina, a cancer biologist at Thomas Jefferson University in Pennsylvania, is currently experimenting with different approaches to remove viable cells from the microfluidic slides for analyses such as whole-genome amplification. Fortina and his team are “confident in achieving the goal,” he wrote in an email to The

Scientist. Fortina had a sponsored research agreement with Celsee Diagnostics in 2014 to compare the performance of the platform against another CTC analysis instrument.

Celsee Diagnostics has begun the process of US FDA approval necessary for clinical use of the Celsee PREP400.