NantWorks and UCLA Researchers Develop Method to Achieve High Accuracy Classification of Cancer Cells in Native Form

System Combines Machine Learning with New Imaging Technology to Avoid Adverse Effect of Chemical Labels
Applications Include Personalized Genomics, Cancer Diagnostics and Drug Development, Among Others

March 24, 2016 08:00 AM Eastern Daylight Time

LOS ANGELES--(BUSINESS WIRE)--Researchers at the University of California, Los Angeles (UCLA) Department of Electrical Engineering in collaboration with scientists from NantWorks, LLC today announced they have developed a new cell diagnostics method that has the potential to open up a new path to data-driven cancer diagnostics and drug development.

Blood tests typically label cells with biochemicals in order to identify them, however these biochemicals (which recognize biomarkers) can cause adverse changes in cells and compromise subsequent analysis. Currently used label-free cell identification techniques, which primarily rely on a single feature of the cell, have limited accuracy.

The new system, on the other hand, integrates deep learning with a novel microscope. The microscope, enabled by the photonic time stretch technique to achieve record high accuracy in label-free cell classification, captures fast images of cells optically, so the images can be digitized and analyzed in real-time, then boosts the images and slows them in time. The new system measures multiple biophysical parameters of cells, eliminating the need to label them, and then uses deep learning to distinguish cancer cells from model white blood cells with high accuracy.

“The new method which combines deep learning with photonic time stretch opens up a new path to better understand the heterogeneous gene expressions in cells,” said Patrick Soon-Shiong, M.D., Chairman and Chief Executive Officer of NantWorks. “The object’s spatial information is encoded in the spectrum of laser pulses, optically amplified and slowed down in time, within a pulse duration of sub-nanoseconds. Now, we can distinguish clusters and debris that would otherwise result in false positive identification in conventional diagnostic methods and overcome the trade-off between sensitivity and speed.”

The technology was developed in the Photonics Lab at UCLA. The effort was sponsored by NantWorks and led by Bahram Jalali, a professor and holder of the Northrop-Grumman Chair in Optoelectronics, doctoral student, Claire Chen, and postdoctoral fellow, Ata Mahjoubfar, as well as Dr. Kayvan Niazi, scientist and chief technology officer (CTO) of NantBio, a wholly owned subsidiary of NantWorks.

The work was published in the March 15, 2016 edition of Nature Scientific Reports, and videos describing the system are available on YouTube. The paper also reports the classification of algae cells based on their lipid content - since high lipid content cells are better for biofuel production, the technology may be instrumental in the development of clean energy biofuels.

About The UCLA Henry Samueli School of Engineering and Applied Science

The UCLA Henry Samueli School of Engineering and Applied Science, established in 1945, offers 28 academic and professional degree programs, including an interdepartmental graduate degree program in biomedical engineering. Ranked among the top 10 engineering schools at public universities nationwide, the school is home to six multimillion-dollar interdisciplinary research center in space exploration, wireless sensor systems, nanotechnology, nanomanufacturing and nanoelectronics, all funded by federal and private agencies.

About NantWorks

NantWorks, LLC, founded by renowned physician scientist and inventor of the first human nanoparticle chemotherapeutic agent Abraxane®, Dr. Patrick Soon-Shiong, is the umbrella organization for the following entities: NantHealth, NantMobileHealth, NantOmics, NantBio, NantCell, NantPharma, NantCapital and NantCloud. Fact-based and solution-driven, each of NantWorks' division entities operates at the nexus of innovation and infrastructure. The core mission of NantWorks is convergence and a systems approach to human biology: to develop and deliver a diverse range of technologies that accelerates innovation, broaden the scope of scientific discovery, enhance ground-breaking research, and improve healthcare treatment for those in need. NantWorks is building an integrated fact-based, genomically and proteomically -informed, personalized approach to the delivery of care and the development of next generation diagnostics and therapeutics for life threatening diseases such as Cancer, Infectious Diseases and Alzheimer's. For more information please www.nantworks.com and follow Dr. Soon-Shiong on Twitter @DrPatSoonShiong.

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