Agilent Technologies

Integrated Biology

ADVANCED SOLUTIONS FOR PATHWAY-DRIVEN MULTI-OMICS RESEARCH

Researchers today are intensely interested in the mechanisms of disease and toxicity. They want to know what is happening *at a biological level* to determine why one person gets sick and another doesn't, and why one person responds to a particular treatment and another doesn't. They want to understand why a particular chemical agent or drug is toxic to one person but not another.

A LAYERED VIEW

Consider the difference between a map and a satellite image. A satellite image shows buildings, trees and other details that don't appear on the map. But it doesn't show the names of the streets. Looking at just one or the other doesn't give you a complete picture. Only when you overlay the two can you see all the important physical elements *and* the street names you need to navigate.

That, in essence, is what integrated biology is all about.

Agilent's GeneSpring software enables researchers to take the same sort of layered view of biology, combining data from different disciplines into one image.

That's a big deal for researchers trying to understand the workings of complex biological systems. And it's a big deal for pharmaceutical companies trying to determine the effects (and side effects) of a given compound.

Genomics, proteomics, metabolomics, and transcriptomics all offer clues. But to really understand disease mechanisms and toxicity pathways, no single discipline is enough.

An integrated approach—looking at biology as a whole system—gives researchers a more complete picture.

To that end, Agilent is pioneering a novel approach to systems biology, biomedical and translational research.

As the sole provider of tools for all four major "omics" disciplines—genomics, proteomics, metabolomics, and transcriptomics—Agilent is enabling researchers to cross new frontiers in biological discovery through dynamic multidimensional solutions.

Proteomics

Proteomic analyses alone cannot provide enough information to fully understand the phenotype of a biological system. Agilent's integrated pathway-centric approach allows for the correlation of effects of protein within the context of other omics pathways.

Genomics

Knowledge of variations in genome structure and sequence is critical to the understanding of disease and hereditary genetic disorders, but must be accompanied by information about the metabolomic, transcriptomic and proteomic response of the system. A pathway-driven multi-omics approach enables precise understanding of how genomic changes generate differences in phenotype.

Transcriptomics

Changes in gene expression or in miRNA levels can help explain the functional behavior of the system for basic research and identification of new drug targets or biomarkers, but cannot account for what happens at the protein, metabolite or genomic levels unless combined with these additional omics studies.

Metabolomics

While metabolomics provides insight as to how the biological system will respond to drugs or other input, it is the integration of other omics studies that enables the complete understanding of how the metabolite profile and other changes in the system correlate with one another.

Bioinformatics

Sophisticated bioinformatics tools are critical for maximizing the biological insight gleaned from multi-omics research. Agilent's GeneSpring bioinformatics software enables multi-dimensional visualization and analysis of individual and collective omics experiments and a deeper understanding of how biological systems are interrelated and function as a whole.

Cutting-Edge Research

Agilent is a trusted partner to leading academic, industry and government organizations for its scientific expertise and groundbreaking technologies for integrated biological research. Among them:

National Institutes of Health|Transformative Research Consortium

Agilent and a team of scientists from six leading research organizations are using a $6 million grant from the National Institutes of Health to pioneer transformative research in toxicology. The consortium, which includes leading investigators from Johns Hopkins Center for Alternatives to Animal Testing, the Hamner Institute, Bloomberg School of Public Health, the U.S. Environmental Protection Agency, Brown University and Georgetown University Medical Center, has been funded to study and map selected endocrine disruption pathways as a first step toward mapping the complete human toxome.

Memorial Sloan-Kettering Cancer Center

Agilent is supplying a collection of leading-edge multi-omics technologies to the world-renowned Memorial Sloan-Kettering Cancer Center for its work in cancer metabolomics. The MSK Metabolomics Core Laboratory is using Agilent's time-of-flight and quadrupole time-of-flight liquid chromatography/mass spectrometry instruments powered by Mass Profiler Professional software.

Johns Hopkins University School of Medicine and Bloomberg School of Public Health

The Johns Hopkins University Center for Resources in Integrated Biology is a state-of-the-art showcase laboratory where students and faculty from both the JHU School of Medicine and Bloomberg School of Public Health are collaborating on novel multi-omics research initiatives.

To learn more, visit Agilent's Integrated Biology Solutions website.

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