

AGILENT CASE STUDY: EMPOWERING RESEARCHERS

RIGHT PLACE, RIGHT TIME AGILENT TECHNOLOGY HELPS RESEARCH CENTER IMPLEMENT MULTI-OMICS APPROACH



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Núria Canela's early research focused on cancer and drug discovery. She gained experience in a variety of scientific disciplines and analytical techniques, but soon realized that each had its limitations.

Then, in 2008, she joined the Universitat Rovira i Virgili, in Tarragona, Spain.

"That's when the idea of creating the Center for Omic Sciences began," Canela says. "I was in the right place at the right time."

Founded in 2013, the center includes an array of Agilent instruments and software solutions, and is dedicated to systems biology. That is, a combination of genomics, transcriptomics, proteomics, and metabolomics.

"When I started out, I was focused on one target: new inhibitors then bind to targets such as CDKs, Cyclins, and so on. But then I thought: To take a big step forward, you need to see the whole system, not only one protein," Canela says.

The center, which she coordinates, has enabled her to do exactly what she wanted to do: expand her perspective.

"We are focusing our research now on nutrition and health, but with the point of view of applying all the omics platforms that we can," she says. "By linking information obtained from different sciences, we can get a more realistic overview of the biological system we are studying. Further, we combine this knowledge into a final whole picture to elucidate which pathways are represented or activated in a particular phenotype."

The microbiome—that diverse collection of bacteria, fungi, and yeasts that reside in our guts—is of special interest.

"We are investigating the effect of the microbiome's composition and functionality in relation with changes in diet and several disorders, such as obesity, metabolic syndrome, and inflammatory diseases," Canela says.

It's challenging work.



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"We are investigating the effect of the microbiome's composition and functionality in relation with changes in diet and several disorders, such as obesity, metabolic syndrome, and inflammatory diseases,"

"In the microbiome, you are analyzing lots of different microbes mixed together," Canela says, "so identifying each one is a problem."

Many of the microbes don't even have names yet.

"First you must describe the diversity of your microbiota with metagenomic approaches," Canela says. "When you have a list of the possible species, you construct your database, putting together the proteomes of these species. Then you construct your own proteome database to do the metaproteomic and metabolomic analysis."

It's the "meta" nature of these studies—encompassing all the genes, proteins, and metabolites in the sample—that makes them so challenging.

"That means not only looking at one single change, but looking for patterns," Canela says.

In other words, how are all these different molecules interacting? Does an increase in one (or two or three) lead to a decrease in another? Such patterns can indicate, for example, whether adding a new food or ingredient to a person's diet is having a beneficial effect—beyond basic nutrition—which is another aspect of the center's research.

Canela notes that the center's workload is split 50/50 between providing analytical services for both academia and industry, and also developing its own research projects. She is proud to point out that, just one year after she joined the center, Spain's Ministry of Economics and Competition recognized the Center for Omic Sciences, along with the complementary Center for Genomic Analysis, in Barcelona, as singular scientific and technological hubs.

The center is equipped with gas and liquid chromatographs as well as mass spectrometers from Agilent—not to mention liquid-handling robots, bioanalyzers, and a microarray scanner—along with related software for integrating omics data and doing pathway analysis, namely Agilent MassHunter Mass Profiler Professional and GeneSpring.

"An important partner, Agilent has solutions for the different omics sciences, and this fits in very well with our approach," Canela says. "These systems facilitate the interpretation and integration of our results from various techniques, and this is very useful for us."

She notes that the center is also developing new tools and techniques of its own.

"Principally we are focusing on metabolite identification along with novel GC/MS, LC/MS, and NMR approaches," she says. "We are implementing these in our research and in our services as well."

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