AI MED

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THE VOICE OF ARTIFICIAL INTELLIGENCE IN MEDICINE

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AIMed
Artificial Intelligence
in Medicine

At Acorn AI, Ana Oromendia leads a team combining machine learning algorithms with omics data to discover more effective patient treatments.

THE NEXT GENERATION OF PRECISION MEDICINE

Ana Oromendia, Geneticist and Director of Product for Value Discovery at Acorn AI knew she wanted to be a scientist when she was 14. "I have always been interested in how the human body works and I find genetics particularly amazing, coming together to form an incredibly complex thing. A human being."

So, she went on to study a degree in biochemistry and microbiology, followed by a PhD in molecular genetics at Massachusetts Institute of Technology (MIT). During which, she began to realize the power of genetics and genomics in offsetting and treating diseases and hasn't stopped working in precision medicine since.

Acorn AI is a company launched in 2019 by Medidata (a Dassault Systèmes company) that leverages artificial intelligence and industry leading expertise to solve the most complex scientific and commercial challenges. Acorn AI is backed by the Medidata platform, which is comprised of more than 19,000 clinical trials and over 5.2 million patients' clinical data. Oromendia heads a team involved in creating analytical tools using large scale biological data (omic data) to improve the efficiency and rigor of therapeutic development.
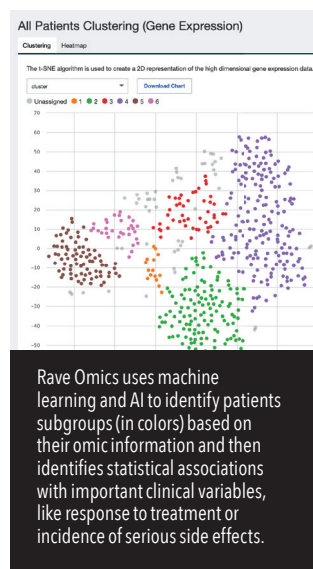
Specifically, they rely on Medidata Rave Omics, an extension of the company's platform which handles translational and omics data via machine learning (ML) algorithms. Oromendia's goal is to help the industry find patient sub-groups that best respond to a drug, to help researchers better tailor the medicine to those that will benefit from it.

"I think there is a tremendous amount of cost – financial, psychological, and emotional – in giving people the wrong medicine; therapies that they will not respond to or have devastating side effects. This, however, is the nature of the 'medicine of averages'. We often know that only a fraction of patients will respond to therapy, but cannot identify which patients.

"Throughout medical history as we've discovered more about human biology, we have been creating more precise definitions of disease. From 'you have a fever', or 'you have an infection', to 'have you been infected by this particular bacterium which is sensitive to XYZ antibiotic?' The more precise the definition of the disease, the more precise and effective the therapy can be.

"The same applies to advanced medical conditions like cancer, whereby patients are given very toxic therapies but not all tumors will respond. So, what we are doing with precision medicine is to move towards better definition of disease. The more we define the disease, the better we can target drugs to them."
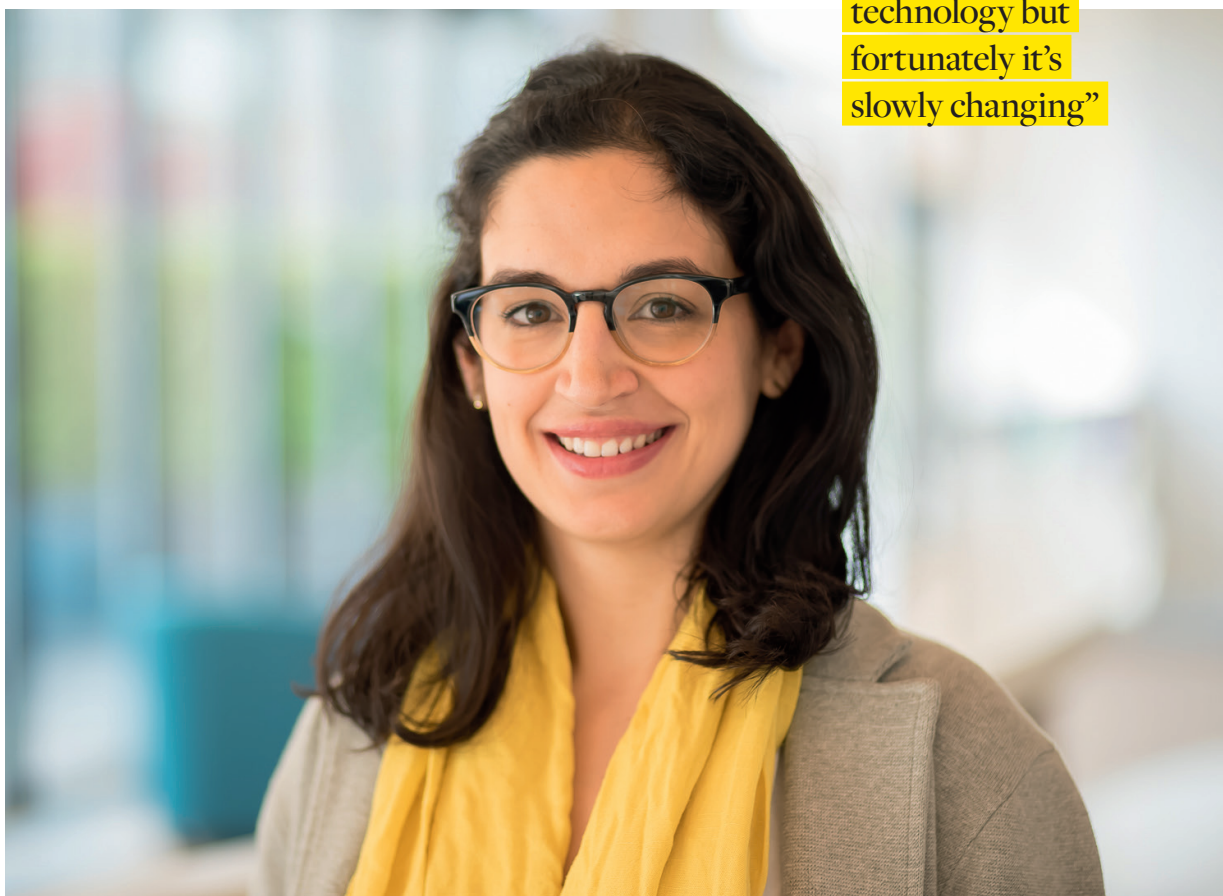
Recently, Oromendia's team partnered with The Castleman Disease Collaborative Network (CDCN) to build and analyze the largest proteomics dataset ever built for this condition. Idiopathic Multicentric Castleman Disease (iMCD) is a rare, life-threatening, and difficult to diagnose disorder affecting around 7,000 people in the US every year. iMCD patients are typically found to have enlarged

All Patients Clustering (Gene Expression)

Rave Omics uses machine learning and AI to identify patients subgroups (in colors) based on their omic information and then identifies statistical associations with important clinical variables, like response to treatment or incidence of serious side effects.

lymph nodes in various regions of their bodies and have symptoms that mimic a tumour malignancy, autoimmune and infectious disease, but the actual underlying disease mechanism is unknown.

With the help of Rave Omics, Oromendia's team quickly discovered that patients with this condition can be subdivided into six distinct types. Of which, one particular subgroup showed the highest likelihood of responding to the drug that is currently administered to all iMCD patients. More importantly, this work was validated on separate datasets. For those patients who do not respond to the drug, the team is now exploring molecular characteristics that will inform the identification of new therapies to treat iMCD patients.

In the long run for partnerships with

At Acorn AI, Ana Oromendia

the life science industry, Oromendia and her team are building tools to create a rich representation of patients through multi-omics analytics and identify the ones who best respond to a particular drug therapy, and those who could be more likely to suffer severe side effects during a clinical trial.

Oromendia is confident about precision medicine going mainstream. However, working at a micro level of the pharmaceutical industry, she often witnesses silos. "I think creating more synergies between technology providers, drug companies, and healthcare systems will help everybody move forward faster. Meanwhile, a lot of education needs to take place. Most physicians do not grow up in an era of precision medicine. It's barely discussed in medical schools."

Obviously, this education has to go beyond the realm of precision medicine. "You care too much about fashion to be smart," was a comment Oromendia once had when she was in graduate school. Whilst it is relatively female heavy in the field of biological research, it is less so when it comes to technology and probably even less in precision medicine. Often, Oromendia would find herself to be the youngest and the only person of Hispanic heritage in a meeting room full of men. She has had to remind herself not to be intimidated and has made it a priority to join and build teams that place a high value on diverse perspectives.

"There is certainly a monoculture in technology but fortunately it's slowly changing," says Oromendia. "I think such change only takes place when we focus and pay attention to it. Sometimes, people don't realize the importance of diverse perspectives to getting the right answer. Because most of us don't know what we don't know, gathering diverse perspectives is the only way which allows us to assess the same problem from different angles. It's really a bit like the scientific process: identify as many unknowns as possible to get to the most accurate answer.

"Ultimately, I think the presence of role models is also important as the culture in technology starts to change. As they share their, often non-linear, career stories, we'll all learn that technologists or scientists don't have to look like the stereotype, or have the traditional degrees or paths into the field. By being out there in the community, supporting, educating, and bringing others along, role models will push the next generation to see something new in themselves." ◼