NM startup radically streamlines drug development

By Kevin Robinson-Avila / Journal Staff Writer

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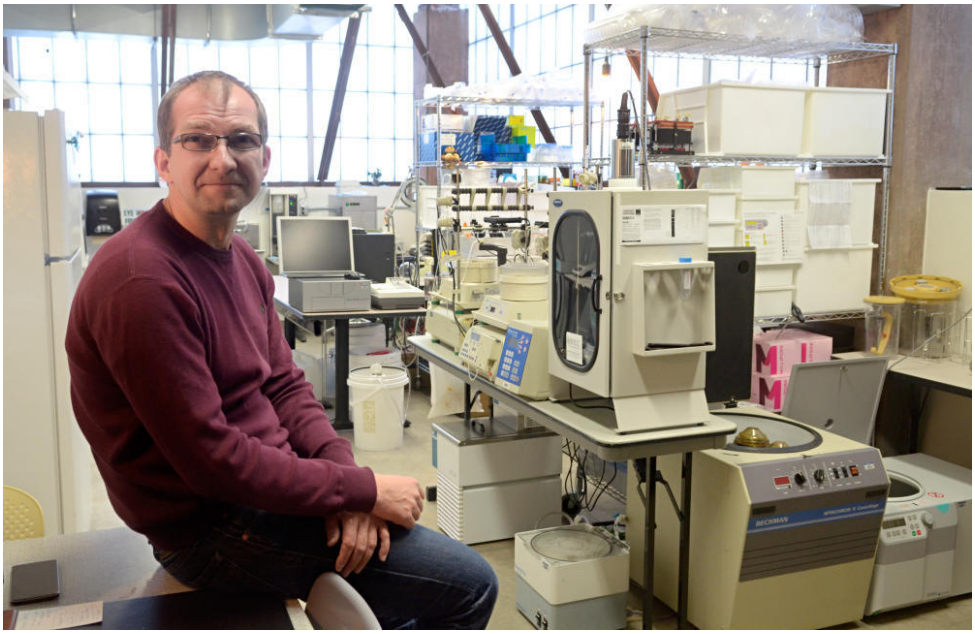

Alex Koglin, co-founder and president of NTxBio, at the company's lab at Santa Fe Community College. Koglin says the NTxBio system can cut the time it takes to develop new drugs. (Dean Hanson/Albuquerque Journal)

Los Alamos National Laboratory has developed a new way to rapidly screen thousands of microorganisms for potential antibiotics, then quickly reproduce them, leading to the discovery of two new compounds that could, eventually, help fight resistant bacteria.

Two of the scientists involved with the project, structural biologist Alex Koglin and human biologist Michael Humbert, are now working to build the system into a commercial platform that could help pharmaceutical companies rapidly push new medicines into the market. They co-founded a new startup, NTxBio LLC, with an initial $500,000 in funding from local investors connected to the Santa Fe-based business accelerator High Desert Discovery District, or HD3.

Koglin said the NTxBio system can cut the time it takes to identify and develop new drugs from years to months.

"It's significantly cheaper and much shorter," Koglin said. "Traditional methods generally take about six to eight years. We've condensed that down to a year and a half."

If successful, the NTxBio process could radically improve today's antibiotic development bottleneck, said HD3 founder and CEO Michelle Miller. That bottleneck has allowed drug-resistant bacteria to cripple efforts to control some diseases, such as deadly skin infections caused by the antibiotic-resistant bacteria MRSA.

"It has the potential to flat out change the way drugs are developed and brought to market," Miller said.

The LANL scientists, led by Koglin, used the lab's expertise and advanced capabilities in genomic sequencing and bioinformatics – the combination of computer science, statistics, mathematics and engineering to analyze biological data – to screen thousands of microorganisms to identify enzymes and microbial processes that have antibiotic potential.

From some 30,000 clusters of enzymes, the team isolated 75 with promising characteristics for further analysis. And from those, it managed to isolate two new antimicrobial compounds, thermocellomycin and aurantiamycin. In further testing, those compounds were shown to inhibit the growth of 13 pathogen species, including MRSA and other bacteria that cause things such as anthrax, plague and a life-threatening gastrointestinal disease.

The team's trick for rapid identification is not just the lab's high-tech advances in genomic sequencing and bioinformatics, but the way the team applied those processes. Rather than just keying in on new compounds, the scientists looked for clusters of enzymes that are scattered throughout cells that work together to form those compounds. It was a matter of identifying the key enzymes that need to be put together in a certain order to reproduce the process

that the cell uses to create antimicrobial compounds, according to Rebecca McDonald, a LANL science writer who described the process in the October edition of LANL's science and technology magazine.

"It's kind of like looking for all the words in a sentence, but not requiring that they be in the right grammatical order – just whether certain words are there, within certain proximity parameters," McDonald wrote.

After keying in on promising compounds, then identifying the enzyme clusters and processes that create them, the team worked to reproduce those compounds synthetically in a lab. Koglin calls it a "cell-free" reproduction process that eliminates the traditional need to grow cultures, which is tedious, slow and costly. Rather, NTxBio builds the compounds by mimicking the way the enzymes originally worked together in cells.

"It's basically a Frankenstein," Koglin said. "All the pieces are there, but it's not living."

By streamlining the process, NTxBio can not only rapidly identify and reproduce new potential antibiotics and other drugs, it could develop a pipeline of medicines to replace antibiotics as bacteria build up fresh resistance, Koglin said. As a result, the new system can immensely reduce drug discovery and development costs.

"The lifetime of patents can be stretched to provide a sustainable revenue stream over many years," Koglin said. "That will lead to the development of many more drugs while also lowering prices."

The company, which moved in December to a lab at Santa Fe Community College, is considering a variety of business models to market its technology. That includes licensing its system to pharmaceutical firms, doing drug discovery and reproduction on contract for companies, or pushing new drugs through pre-clinical studies on its own before allowing established drug companies to take over.

Company investors say they're now working to establish critical industry partnerships and develop the right business model.

"This company truly has the ability to be New Mexico's unicorn," said Matthew Ennis, a serial entrepreneur and one of the NTxBio investors. "It's still at a very early stage and many things can go wrong, but the core elements of the technology are very compelling."

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