

Son's death fuels new genome company



Christopher J. Brooks, @AmericanGlow

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(Photo: Comstock, Getty Images)

Al Katawazi's business spawned from tragedy.

In June 2014, Katawazi's 5-year-old son William unexpectedly died of sudden cardiac attack. Not long after, a doctor at Strong Memorial Hospital discovered that a section of William's DNA wasn't built correctly. The incorrect DNA strand was supposed to make the electrical currents to his heart and because it was deformed, William went 40 minutes without oxygen and died 8 hours later.

Katawazi questioned Dr. Kristin Da'co until he finally understood what happened.

"It didn't come from my wife or me," he said. "It was a mutation that formed as an embryo. If we knew ahead of time, we could have saved our son."

Katawazi doesn't want anyone to experience what he and his wife, Heather, endured. That's why he created [Geneopedia](http://geneopedia.com/Main/About) (<http://geneopedia.com/Main/About>), a company that he hopes will be an online database for hundreds of thousands of DNA strands. He started his company in April — less than a year after William died — and it is housed in Rochester Institute of Technology's business incubator [Venture Creations](https://www.rit.edu/research/vc/) (<https://www.rit.edu/research/vc/>).

The four-person Geneopedia team, which includes Katawazi's younger sister Dina and an RIT graduate student, is downloading digital versions of patients' DNA sequences from computer servers across the country and storing them. When that's complete, Katawazi said his company will officially launch at year's end.

Katawazi said Geneopedia aims to solve two problems: Preventing another premature death is one, but computer file storage is the other issue.

DNA, short for deoxyribonucleic acid, is a tiny molecule that holds the instructions for creating, working and reproducing all living organisms. In its basic form, the DNA strand can be expressed in four letters — A, C, G or T. . The entire DNA strand is a mixed combination of A,C, G or T — and 3 billion letters long.

A vast majority of DNA is similar from human to human. However, 3 million of those letters are unique to a specific person. Katawazi said his son's death was a rare mutation in one of William's unique 3 million.

"One letter was off out of the 3.2 billion," said Katawazi, who has a 3-by-5 photo of William on the back of his business cards. "The letter should have been a G and it was an A."

To store an entire DNA sequence digitally, it takes upwards of 120 gigabytes — equivalent to up to 65,000 iPhone photos. Most hospitals have more than one patient, so storing several patients' DNA at 120 GBs per person becomes impossible. Katawazi, who has education and professional experience in big data science, spent eight months creating a "compression algorithm" that shrinks the file size from 120 GB to 5 GB — saving roughly 95 percent of the storage space. By making the files smaller, his company can house more for everyone to search.

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The business plan, Katawazi said, is for geneticists and researchers to use the free search engine part of his database for the first two or three years. The database will then learn the typical ways researchers search and analyze the data and begin mimicking all of the analysis automatically. Katawazi plans to send the automated data analysis part to doctors and medical centers for a monthly subscription.

“So our end game is to make this useful so that the normal doctor can use it and know how to save their patient’s life,” he said. “We’re essentially a search engine, but for genetics.”

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AI Katawazi, 35, of Rochester explains how the device behind him extracts an entire DNA strand from a person’s blood sample or hair follicle. Katawazi is the founder and CEO of Geneopedia. (Photo: Khristopher J. Brooks/staff photographer)

Katawazi’s company is trying to further a growing field in medicine called bioinformatics. People who study the subject say Geneopedia is adding to a new national push to get genetic information stored and shared online easily. However, Katawazi’s company is steering the movement in a slightly different direction, said one expert at Georgia Institute of Technology. Mark Braunstein, associate director of Georgia Tech’s Health Systems Institute, said people in bioinformatics are working to store entire DNA strands and their variations based on a specific known disease or known mutation. Major medical universities like Harvard, Stanford and Duke are creating these databases of genetic information and calling them Application Programming Interfaces, or APIs, Braunstein said.

The problem with APIs, Braunstein said, is that they’re scattered across the country, leaving open a potential security breach of people’s sensitive medical information.

“This really needs to be in one centralized location,” he said, adding that anyone working to centralize the information “is part of a really important story.”

Aravinda Chakravarti, a human geneticist and computational biology expert at Johns Hopkins University, said medical centers don’t keep APIs in part because doctors don’t care much about seeing the entire DNA sequence, just the part that’s unique to the patient. Doctors haven’t housed large DNA files because it’s unclear if spending that money is worth it yet either, Chakravarti said.

“Most of the genome is not interruptible, so we don’t know what we’re doing and this is a beginning, evolving field,” he said.

Chakravarti said it’s not surprising that Katawazi is working on shrinking file sizes of DNA. Another group called 1000 Genomes, staffed with researchers from Harvard and the National Institutes of Health, are somewhat working on Katawazi’s same concept.

If Katawazi’s company can grow larger while making searches simple, Braunstein said physicians can get genetic information as quickly as we shop for products on Amazon.

“Think of it as a doctor online ‘shopping,’ so to speak, for a particular patient’s genome,” he said. “Ideally, you’d want genetic data for millions of patients.”

In its short existence, Geneopedia has garnered regional attention. The company is one of three startup finalists in the health care technology category for a Digital Rochester GREAT award. Geneopedia is also one of 110 semi-finalists for a \$1 million prize from Buffalo’s 43North contest (<http://www.43north.org/semifinalists>).

Katawazi and his team recently showed his product to a group of researchers at Golisano Children’s Hospital.

Tom Mariani was one of the researchers who sat in the presentation.

“There was a lot of discussion during his presentation and questions about his products,” Mariani said. “Al’s plan was to make his compression algorithm freely available to the group for their use and I know many were interested in trying it.”

Katawazi, 35, is an Afghanistan native who moved to the United States in 1983. When he’s not worrying about databases, genetics, DNA and startup money, he’s into canning, watching Netflix with his wife, cycling and caring for Scout, his blind, 9-year-old black Labrador.

Geneopedia is Heather and Al’s full-time job. The two recognize there’s a chance their startup could fail; national statistics suggest 90 percent of startups do. The couple said they hope that Geneopedia becomes profitable, but ultimately they’re building this company to help fill a knowledge gap and pay homage to their son.

“He got sick and died the same day,” Heather Katawazi said. “In a lot of ways, this is our way to channel our grief.”

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