

## Backed by \$8.3M Financing, Synthego Launches With Synthetic Guide RNAs for CRISPR/Cas9

Aug 25, 2016 | [Andrew P. Han](#)

*This story has been edited to address guide RNA price comparisons between Synthego and certain competitors. An earlier version also included a quote comparing Synthego's prices to TriLink BioTechnologies'; however, TriLink offers Cas9 mRNA for CRISPR, not gRNA.*

NEW YORK (GenomeWeb) – A new Silicon Valley-based biotech startup is hoping CRISPR/Cas9 genome editing is the perfect field to launch from.

Synthego, already four years old but just emerging from stealth mode this month, touts itself as a research automation firm. It has built both software and hardware, drawing on the experiences of its founders, brothers Paul and Michael Dabrowski, when they worked at the private spacecraft company SpaceX.

"We're the tool builders for scientists," Synthego CEO Paul Dabrowski told GenomeWeb. "We're trying to enable high-throughput and -volume experiments. We think that's where science gets better."

For its first application, the company has chosen to jump into the field of synthetic nucleic acids. While companies like Gen9 and Twist Bioscience are making DNA, Synthego has chosen to focus more on RNA, specifically synthetic guide RNAs for CRISPR genome editing, placing it in competition with GE Dharmacon and IDT.

"We want to make sure there are tools out there that realize the full potential of CRISPR," Dabrowski said. "Because of the automation and new technology that we've developed for liquid handling, we're able to make products faster, cheaper, and higher quality."

To that end, Synthego has enlisted several early-access partners including labs at the Massachusetts Institute of Technology, Harvard University, Stanford University, the University of California, Berkeley, and Seattle Children's Research Institute. The firm also has at least one pharmaceutical partner, but declined to disclose it.

So far, Synthego's plan seems to be working. While it isn't selling chemically modified single guide RNAs, Synthego has made them available to its early-access partners. "We've had really high editing with those guides in particular," Michelle Christian, a scientist at Seattle Children's Research Institute studying genome editing for hemoglobinopathies, told GenomeWeb. "We tested four or five loci off the bat and saw cutting efficiency of [at least] 70 percent, and up to 90 percent efficiency."

It's not just scientists who seem to be impressed — Synthego has already raised an \$8.3 million Series A round and closed several smaller private rounds, Dabrowski said.

Synthego is another bet that automation and the Silicon Valley ethos of iterative design can translate into biotech. In addition to working at SpaceX, Paul Dabrowski also worked at Halcyon Molecular, the microscopy-based sequencing firm that shuttered in 2012.

It's more than just a nucleic acids company, although that seemed to be the best place to start, Dabrowski said.

"One of the big things we think about is how to scale a process," he said. "Our core tech is very scalable. We can grow to doing hundreds of thousands of simultaneous workflows. If you get scale down, then your consistency ends up good, prices end up being good, and your productivity is good."

Dabrowski pointed to serial entrepreneur and SpaceX founder Elon Musk as an example he'd like to follow with Synthego. "When we were at SpaceX we saw how that was applied to building space rockets. Musk set up as much automation as he could. He set up designers that build the parts and immediately test them the next day. We want that same concept brought to biotech."

Thus, the innovation is in the software and hardware and not in the biology. The firm is using traditional TBDMS phosphoramidite synthesis chemistry that is not proprietary. "But that allows us to be cheaper," Dabrowski said.

Its main products are CRISPR/Cas9 gRNAs, both 100-mer single guides and crisperRNA-tracrRNA pairs. Custom guides and guides for alternative enzymes like Cpf1 are also available. Academic and volume discounts are available, Dabrowski said.

The firm doesn't have any design tools yet, so customers must come with a guide sequence in mind. There's a web portal for ordering and dual RNA guides cost \$79 per target (2 nanomol), delivered on a plate in three to five days, if everything goes accordingly. Christian, the Seattle Children's researcher, added that turnaround time after submitting an order is "quite rapid."

For comparison, IDT offers 2 nmol crisperRNA for \$95 per target and offers tracrRNA separately.

For single guides, Synthego charges \$295 per target (1 nmol). Brett Robb, scientific director of RNA research at New England Biolabs, said that Synthego's sgRNAs are comparable on price with his firm's EnGen sgRNA synthesis kit, at the low end of the kit's yield — approximately \$9 per microgram, each. NEB's kit also requires ordering 55 nucleotide single-stranded DNA oligos from another company and about an hour's worth of work to synthesize the guides. At higher yields, the NEB kit becomes more competitively priced, as low as \$1.50 per microgram.

For chemically modified guides, Dabrowski said the firm was also around the \$300 price point at the moment, adding that it's an area of great potential for the company in the near term. DNA synthesis could also be an area the firm devotes more attention to. "It's a bigger market, but the margins aren't as good, so we're not focused on that first," he said. "It's an interesting avenue down the road when we have even more capacity."

The company doubled to 40 people in the last year and Dabrowski expects to double again next year.

But he has even bigger plans in the long term.

"In the future, we'd like researchers to do experiments through a cloud laboratory or virtual lab, where you type in a couple commands to a website and then you do a thousand experiments," he said. "Right now I don't think anyone ready for that. I don't think the market's there, so we're connecting our product with the scientists directly. In the future, you could imagine that the services expand into actually being able to do those things."