Q&A
COVID-19 Testing at Scale while Reimagining Healthcare: An Interview with Curative Cofounders Fred Turner, Isaac Turner, and Vlad Slepnev

Curative Inc., created in January 2020 with the intent of improving diagnostics for sepsis, pivoted to SARS-CoV-2 testing in March 2020 as it became clear that the United States needed additional testing capacity. Cell Systems spoke with Curative cofounders Fred Turner, Dr. Isaac Turner, and Dr. Vlad Slepnev about their work developing and deploying a COVID-19 oral fluid test at scale with unprecedented speed.

Tell us a little bit about your backgrounds.
FT: I moved to the Bay Area after dropping out of Oxford University because I knew that I could learn and achieve more while exploring the questions and topics that fascinated me outside of the classroom. Prior to Curative, I started and pivoted two biotechnology companies in Silicon Valley. One was an a16z and YC-backed diagnostics (Dx) startup that built a CLIA lab for validating and launching an STD testing product. This product was administered to over 10,000 patients in medical centers across 5 states. I was also named one of the top 100 practicing scientists in the UK by the Science Council 2013.

IT: I am the Chief Information Officer of Curative. I have a PhD in Bioinformatics from Oxford in DNA sequence analysis. I have developed algorithms for interpreting Illumina and Oxford Nanopore sequencing data, and I am passionate about taking technical innovation into the clinic and scaling these processes—making better diagnostics available to millions of patients. Previously at an a16z-backed biotech startup, I helped establish a clinical lab offering novel antibiotic susceptibility tests.

VS: I am the Chief Scientific Officer of Curative. I previously led teams that have built and launched 10 FDA-cleared diagnostic products in the infectious disease space. I led molecular R&D at Meridian Biosciences (public Dx company), which developed 9 FDA cleared tests + 13 CE marked tests. I am a cofounder of Primera Dx, which raised more than $50M and sold to Qiagen.

When did you realize that there was a need for innovative solutions to scale up testing in the US and an opportunity for Curative to step up?
FT/IT/VS: In late January, we became concerned that the United States would be constrained in its ability to test for COVID-19. With our expertise in sepsis diagnostics, the team began exploring the pivot to COVID-19 testing. For many companies, pivoting isn’t easy—it requires decisiveness and tough decisions to leave behind a cause or a direction that teams felt committed to after pouring their energy into a particular direction. As we pivoted, we worked toward the goal of putting ourselves out of business with the end of COVID-19. The approach was unorthodox and gave our team an incredible sense of mission. Unfortunately, the pandemic continues and accordingly, we have outperformed all expectations: Curative now captures up to 10% of the daily COVID-19 test samples across the United States, and we’ve continued to create innovative ways to bring testing to the masses.

You have developed a new test. How does it work and what were the main considerations in developing it?
FT/IT/VS: We pioneered the oral-fluid swab test in the United States. The oral-fluid swab test is an observed, simple-to-use, self-administered test that takes only 20 seconds to complete. Our two main considerations when developing the test: reducing exposure to healthcare workers and the use of PPE, along with developing a more accurate test. Our approach eliminates the need for healthcare workers to come in close contact to administer nasal pharyngeal tests.

It also eliminates the frequent PPE changes other testing methods require. Our test also requires the patients to
cough three times before the patient swabs the inside of their mouth, so as to bring up possible virus matter in the respiratory tract, as well as saliva in the mouth. Clinical trials have demonstrated Curative’s oral-fluid swab test has a clinical sensitivity of 89.7% with 100% specificity.

What were some of the initial, perhaps unexpected, challenges you faced?
FT/IT/VS: We anticipated supply chain issues, so we purposefully developed an orthogonal process that doesn’t rely on the same supplies all the other test companies use. This has allowed us to keep our supplies stocked, and thus continue the delivery of rapid testing and results. While many labs were facing shortages in the supply chain, we approached every element to ensure that we had stability in our process and provide results to patients quickly—within 48 hours.

What enabled you to address these challenges, and how have you been able to scale testing?
FT/IT/VS: Our rapidly growing team of over 1,000 doctors, scientists, engineers, and other employees designed Curative’s end-to-end testing process to ensure widespread access to COVID-19 testing and eliminate aspects of other testing models that slow the process. Scaling testing isn’t just about lab capacity, it depends on the entire infrastructure. Every touchpoint must be efficient, and that is what we have built and are continuing to improve on.

Our tests use different materials from a variety of sources compared with competitors to eliminate supply chain shortages. From the building of the test kits, test deployment, lab work, and sending patient results within 48 hours, we have re-imagined testing at scale.

Another reason we have fast turnaround times is our focus on keeping the lab time under 24 hours and decreasing the shipping time. Other labs take multiple days for lab processing, slowing the delivery of results. We’ve been focused on how we can get samples to the lab quickly. For example, we have put samples on cargo commercial flights to get into the lab the same day.

It has been through strong partnership with a firm called Gothams that Curative has successfully blended our scientific process with operational excellence to mass deploy millions of COVID-19 test kits across the United States to over 7,000 locations.

In everything that we do, we’re looking for ways to make large and small improvements on existing systems. From the way we source materials, the customized software that we have built to run every part of the testing process, and the teams that we have hired across the country to support the patient experience to ensure that we have rapid, painless, and reliable testing.

How do you distribute your test kits and get them back to your testing labs?
FT/IT/VS: We have a comprehensive supply chain and logistics team layered with a custom software solution that helps us to forecast, distribute, and return test kits to the lab closest to the testing site. Our local partners include states, cities, local governments, businesses, and community organizations, and we work with them to deploy a testing set up to fit the needs of the community. The Curative team provides a turnkey solution for communities to support expanded access to testing through our drive through, kiosk, and mobile van test environments.

How many tests have you done, what’s your current capacity, and what are you aiming for?
FT/IT/VS: We’ve done 5 million tests so far, and our current capacity is 1 million per week. We will continue to scale our testing capacity if the United States continues to need additional testing support.

What do you see as the current major bottlenecks to testing as widely and frequently as necessary to control the pandemic?
FT/IT/VS: We’re not seeing any lab bottlenecks right now. We have more capacity and continue to take on new states and counties to scale our testing. The bottlenecks that exist are typically in two places. First, the logistics of bringing a test kit out to the population, completing the collections and returning it to the laboratory. We are continuously optimizing our process to reduce turnaround times and streamline the process to improve the customer experience.

Unlike in the early days of the pandemic in the United States when there were not enough tests to go around for those who wanted to be tested, there is now some “COVID fatigue” and misinformation about the importance of testing, how to get tested, and where to test. Our painless oral-fluid test is completed through a simple mouth swab. It’s self-collected and takes only 20 seconds at no cost to the patient. More people need to test regularly to identify outbreaks of COVID-19 so the country can re-open safely. We know that broad access to testing for asymptomatic and symptomatic people helps to reduce positivity rates.

An example of a recent success we had was in testing all nursing homes and assisted-care facilities across the state of Florida. We tested the staff of over 6,000 facilities on a bi-monthly basis. Curative rolled out the first round of 500,000 kits across the state within 4 days of executing the contract. Throughout this 90-day period, Curative reduced the positivity rate from over 6% to less than 1%. By targeting the testing to staff at these nursing homes and other care facilities, we were able to help teams identify positive cases and reduce the spread of the disease in the facilities.

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Update

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Correction
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In the original published version of this Q&A, the COVID-19 test was described incorrectly. The test does not involve spitting in a test tube. It instead requires the patient to swab the inside of their mouth. This information has been corrected, and the interviewees apologize for any confusion this error may have caused. The original version of the Q&A also incorrectly stated that the number of tests done to the date of publication were 4 million. The correct number is 5 million. This discrepancy was due to an additional 1 million tests performed between the drafting of the Q&A and its publication. This error has now been corrected.