



BGI chairman and co-founder Wang Jian and a team of colleagues arrived in Wuhan on January 25 to lead BGI's emergency efforts.

BGI's Coronavirus Response? Building a Lab in Wuhan, China

When the number of cases of the novel coronavirus (SARS-CoV-2) started to rise in Wuhan, the epicenter of the outbreak, throngs of people evacuated the city until the borders were sealed. At the same time, a group of scientists headed in the opposite direction—into the center of the outbreak. The scientists, from the Chinese genome sequencing company BGI Group, traveled to Wuhan to establish a lab to test samples for the presence of the virus. The Huo-Yan Lab, or Fire Eye Lab, was jointly established by the Wuhan Municipal Government, Wuhan East Lake High-Tech Development Zone, CCCC Second Harbor Engineering Company, Shanghai Nori Laboratory Equipment Co., and BGI.*

According to the twitter feed of Scott Edmunds, PhD, editor for *GigaScience*, a “big data” journal published by BGI and Oxford University Press, Fire Eye refers to Zhurong, the Chinese god of fire’s historical connections to Hubei. “[Under the gaze of] this panopticon (fueled by qPCR & sequencing), the virus will have no place to hide,” Edmunds explained.

“Accurate detection and diagnosis are as important as clinical rescue to defeat this epidemic,” said Wang Jian, BGI co-founder

and chairman. Jian told *GEN*, “We have in our hands a scientific toolkit to fight the outbreak.” At present, he continued, accurate qRT-PCR detection is a crucial tool for clinical diagnosis of infections, from assessing initial symptoms to release from isolation, recovery, and discharge. Jian noted that high-throughput DNA sequencing is “the most accurate and reliable method to understand the virus and the only way to dynamically track virus mutations” and that antibody testing is a necessary method to assess the infection rate and recovery of the population. In combination, Jian stressed, “these are the best tools to rapidly enable infection prevention and control.”

The company set up an emergency response center in Wuhan to mobilize testing efforts and expand manufacturing capacity, with staff working around the clock to produce the testing kits and arrange storage, transportation, and other logistical services.

The lab was up and running in about one week. On February 5, the 2000-square-meter emergency detection laboratory, which was run by BGI and designed to handle 10,000 samples daily to detect SARS-CoV-2, officially started trial operation in

Wuhan. Now, with the diagnostic lab, “BGI will provide the technology and personnel support to ensure the formation of these large-scale testing capabilities,” noted Shida Zhu, BGI’s chief coordinator in Wuhan.

“The folks at BGI have taken on a huge risk to their own health,” noted Laurie Goodman, PhD, editor-in-chief at *GigaScience*. She told *GEN* that the team in Wuhan has “closed down all holiday plans and diverted resources from other research projects in order to be able to take on the enormous and costly task of helping during the outbreak.” Moreover, Goodman asserted that the head of BGI, Wang Jian, who is “wealthy in his own right” is leading the team in Wuhan. “I’m trying to imagine,” she continued, “other folks who have built wealth off of technology, going into the heart of a disaster and staying there to work—not just for a photo op.”

The kits

BGI has one of its main production bases in Wuhan, which gives the company a geographical advantage in being able to supply to Wuhan and Hubei Province quickly and at large scale. The testing kits are being produced in BGI’s facility in Wuhan, where the company has shipped raw materials for the kits through an emergency logistics channel approved by the government.

BGI has announced the donation of kits for 20,000 patients and pledged to work with other companies and charities to donate kits for another 100,000 tests.

There are currently two types of kits for the detection of novel coronaviruses: one is a rapid detection kit based on qRT-PCR, and the other is a detection kit based on high-throughput sequencing. The combination of qRT-PCR and metagenomics

technology can detect the SARS-CoV-2 virus faster and more comprehensively, noted Jiang Hui, COO of MGI, the manufacturing subsidiary of BGI, and monitor the mutations that may occur during transmission of the novel coronavirus through thousands of hosts.

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As the virus spreads, it may mutate and affect the sensitivity of qRT-PCR. The metagenomics PMseq RNA products can make up for this shortcoming and monitor possible mutations. Also, for some samples with lower virus content, when the detection level is lower than the minimum detection line of qRT-PCR products, PMseq products can effectively increase the positive rate when the host background is low.

BGI’s fast test kit is commercially available internationally, equipped with an English manual, instructional video, and online training/troubleshooting when it is

needed, noted Terence Xiong, BGI’s deputy director for international development. Following requests from more than 20 countries, diagnostic kits have been sent to many parts of the world.

BGI has called for an alliance in China to help fight the epidemic, noted Hui. A joint anti-epidemic initiative was launched on February 1. As of February 2, 131 companies had signed on and are willing to suspend their ongoing research work and business operations so they can devote their dozens of PCR laboratories, gene amplification test laboratories, P2 laboratories, and CAP certification laboratories—as well as their medical and research instruments, sequencers, etc.—for anti-epidemic and antivirus work. There are more than 100 research instruments, several kinds of test kits, and donations of tens of millions of yuan (millions of USD), covering 22 provinces and cities. **GEN**

*The East Lake High-Tech Development Zone provided the site, BGI led the design and operation, the Second Harbor Engineering Company led the construction, and Shanghai Nori provided a large amount of laboratory equipment.



Wang Jian in the BGI Wuhan situation room.