

A scientist in the pandemic

As India could become a hotspot for zoonotic disease emergence, research must be proactive



UMA RAMAKRISHNAN

I looked up to see the tall, willowy figure filling my office door. It was common to see Obaid Siddiqui on the path from the laboratory to the canteen, but a pleasant surprise to see him in my laboratory. It was 2008. I had joined the National Centre for Biological Sciences (NCBS) as a young faculty member in 2005. “Can you test for swine flu in your laboratory,” he asked. Swine flu was spreading at the time in India, and he was curious. My research was on genetic variations in animals. I collected field samples, isolated genetic material from these samples, and sequenced or ‘read’ parts of this genetic code. Sometimes we were unsure what animal the material was from, so we designed protocols to look for specific genetic material. This is exactly what is done in a diagnostic test that is based on genetic material. Biosafety protocols notwithstanding, yes, it was possible. We had the equipment that was needed, and the students and postdocs had the skills. Yet this had never occurred to me. Our research was long term and attempted to address basic questions, not nimble and responsive to real-life situations or service oriented.

COVID testing

I remembered this conversation in March 2020. The COVID-19 pandemic was spreading across the world. India was going into lockdown. The thought of COVID-19 spreading across the Indian populace was mind-boggling. The best strategy was to increase number of people tested daily. But how? Only 15 laboratories in Karnataka were equipped to test for SARS-CoV-2.

What would it take to set up a diagnostic facility to test for SARS-CoV-2 on our academic, basic science-focused campus? An office order issued by the Principal Scientific Adviser, Government of India, encouraging central research labs to begin testing, and strong support from the Secretaries, Department of Biotechnology and Department of Atomic Energy, gave impetus to our efforts. Following rigorous regulatory approvals by the institutional biosafety and human ethics committees, and networking with the Karnataka State COVID cell, we were ready to start testing. We identified a laboratory space, and a dedicated team of volunteers from the campus community. A few of us faculty would supervise all aspects of the process,

including sample receipt and inactivation, testing for the presence of the virus and reporting these results on the ICMR portal.

The testing facility became operational on April 13, 2020. From the trepidation of the first set of 15 samples, we were soon testing hundreds a day. Daily and consistent efforts from campus volunteers, staff and faculty, with unwavering support from the campus leadership, made this a reality. Summer gave way to the monsoon, and the festive season, and cases in Bengaluru soared. Volunteers were replaced by regular staff. Our diagnostic centre prevailed, testing samples non-stop. Alongside mushroomed several applied and basic research efforts. Our scientists developed tools to study the virus more effectively, used genome sequencing to characterise viral evolution over time, and set up pipelines to test the efficacy of Food and Drug Administration approved drugs.

Larger crises

We recently reported 1 lakh tests, reminding me what this journey has taught me. Like many born in the 1970s, I grew up on a diet of nationalism. Inspired by Gandhi’s speech, my paternal grandfather and his brother walked from their village in Tamil Nadu to Sabarmati to participate in the independence movement. I longed to have been alive then, to do something real in a time of crisis for the nation. The pandemic provided scientists this opportunity. But as a scientist who works on biodiversity, I know larger crises are brewing. Global meta-analyses reveal that zoonoses tend to emerge in areas with many mammal species, high land use and land cover change, and high human population density. Studies predict that India will be a hotspot for possible zoonotic disease emergence. India’s approach to addressing zoonoses has primarily been reactive, with research and public health intervention beginning when there is an outbreak. The scientific question remains: can we proactively predict an outbreak? Can we sample viral and bacterial diversity from wild reservoirs like bats and rodents in our biodiversity hotspots? Can we understand how ecological and evolutionary dynamics of possible pathogens and their wildlife hosts can become hotspots of spillover? Can we then monitor these possible hotspots to detect spillover events very early or before they happen? Understanding these questions will require teams of interdisciplinary scientists and sustained efforts. Working with the testing efforts taught me that we can come together for a common cause.

Uma Ramakrishnan is Professor at NCBS, TIFR and a member of the Biodiversity Collaborative