

How One Conference Spread the Virus to Thousands

By Shlomo Maital



We have consistently underestimated the degree to which the novel coronavirus is contagious and able to spread rapidly. And we keep waking up to bars, schools, universities, etc. creating new hotspots.

Now, Angus Chen, a WBUR Boston radio reporter, reports on a new study by experts at Harvard-MIT's Broad Institute, about how an innocent conference sponsored by biotech giant Biogen, in Cambridge MA., led to thousands of infections.

Early in the pandemic, state health officials counted 99 coronavirus cases stemming from a fateful Biogen meeting that turned into a superspreading event. Now, new genetic evidence suggests the infections unleashed at the Cambridge biotech company's gathering in February washed through the Boston area and rippled across the world. Overall, the data suggests the event led to 40% of all COVID-19 infections in the Boston area as of July 1, says Bronwyn MacInnis, a viral genomicist at the Broad Institute of MIT and Harvard and the senior author of a new, pre-publication study that attempts to trace the viral descendants of that outbreak. That translates to tens of thousands of cases. "It's fair to say it's striking. [The conference] certainly has had an impact on the trajectory of the pandemic domestically and abroad," MacInnis says. *"It's a great example of how connected we all are, and how viruses are agnostic to how they move and who they may infect. The activities that happen in one corner of a society can have far-reaching effects on others."*

Is there a positive message in this super-spread episode? There is.

President Trump's mantra, America First, revives selfish narcissistic world views, that has alienated allies abroad. And there are significant groups outside of America who embrace this me-only view.

Along comes the virus, and recites John Donne's 1633 poem, and teaches us anew its message:

Each is a piece of the continent,

A part of the main.

If a clod be washed away by the sea,

Europe is the less.

As well as if a promontory were.

As well as if a manor of thine own

Or of thine friend's were.

Each man's death diminishes me,

For I am involved in mankind

If the virus is not contained in California, Massachusetts will be at risk. If the virus is not contained in the US, then Germany is at risk. If the virus is not contained anywhere, then everywhere else is at risk.

Each person's infection diminishes everyone else. For we are all involved and connected, in humankind. Nature has conspired to teach us this lesson, in a most painful and costly manner.

Genetic 'Fingerprints' Suggest Superspreader Biogen Conference Seeded 40% Of Boston Coronavirus Cases

August 25, 2020

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“It seems pretty clear that the spread that initiated in the context of the conference went beyond certainly that event and beyond the city and reached populations across the U.S. and in various corners of the world,” she says.

When MacInnis looked at virus sequences her colleagues had uploaded to a shared scientific database, roughly 3% of coronavirus genomes sequenced across the country — and 1.6% worldwide — bore the same distinctive genetic markers as those coming out of the Biogen conference.

In particular, the study, just posted on the online research repository MedRxiv, documents the spread of the virus from biotech executives to people experiencing homelessness in Boston.

"It took just a few weeks before this virus essentially made its way from this international business conference into this very vulnerable population," says Dr. Jessie Gaeta, chief medical officer of the nonprofit Boston Healthcare For The Homeless, who worked on the study.

The researchers found the coronavirus entered Boston's homeless population seven separate times. At least two of those infections seem to have come directly from someone infected at or just after the conference. Gaeta says how exactly that happened is something that she's pondered a lot.

"I wondered if someone staying in a shelter might have actually worked in the hotel where the conference was hosted, for example," Gaeta says. "Or are there staff who work in the shelter who had some other interaction with the conference attendees?"

Once the virus reached the city's homeless population, it spread rapidly. Of the 193 distinct coronavirus genomes that the researchers collected from residents experiencing homelessness, 122 likely share an ancestor from the Biogen conference.

“That, I think, is this molecular evidence of just how quickly this virus spreads in a congregate living environment,” Gaeta says. “A take-home of this piece from my vantage point is that we've got to figure out how to protect vulnerable populations better from disease transmission.”

Following The Fingerprints

As the virus spreads from person to person, its genetics change gradually, MacInnis says. Over time, the accumulation of these mutations creates a genetic fingerprint that researchers can use to track the origin and spread of COVID-19.

When people began getting infected in the Boston area, MacInnis and her team began sequencing the genomes of coronavirus samples from local patients and combining their data with coronavirus genome sequences from colleagues around the world.

“Reading the kind of genomic fingerprint of these viruses gives us one of the most fundamental levels of information about what is the beast that is causing these infections,” MacInnis says. “How did I get this, and where did it come from and why? Some of these answers lie within these genetic fingerprints.”

Although the researchers did not identify the conference in the study as the Biogen meeting, WBUR confirmed it was the gathering of a couple of hundred high-ranking employees that took place at the Long Wharf Marriott in Boston at the end of February.

Some of the attendees came from Europe, where the coronavirus was igniting national crises in Italy and Spain. The virus that infected the Biogen employees most likely originated in Europe. It carried a distinctive mutation that researchers labeled C2416T.

MacInnis thinks that as the C2416T virus spread through the conference, another mutation – called G26233T – occurred, either at the conference or immediately after. As MacInnis expanded her database of genomes collected in Boston and beyond, these same two mutations began showing up again and again.

The finding suggests that descendants of the same coronaviruses that spread through Biogen's ranks later wound their way through the city's population and appeared in the suburbs around Boston, some affluent and some less so.

It's the idea of the spark landing in this dry bed of grass.

VIROLOGIST PAVITRA ROYCHOUDHURY

Soon after the conference ended, the genetic fingerprint from the coronaviruses at the meeting showed up in cases from Washington, D.C., to Illinois and North Carolina.

The broad reach of the Biogen conference is no surprise to some scientists.

“A conference attended by so many people who presumably stayed in hotels, went out into the city doing their things that they would do and contacting so many people – when cases were relatively low,” says Pavitra Roychoudhury, a virologist at the University of Washington who did not work on the study. “It's the idea of the spark landing in this dry bed of grass ... I'm not surprised that it had a far-reaching impact.”

Roychoudhury says that although the paper has not been formally peer-reviewed yet, the work captures how far the virus spread after the Biogen conference and the influence that superspreading events can have early on in the course of a pandemic.

“I thought it was really well done,” she says.

Biogen worked closely and eagerly with the Broad Institute to provide data for the study, says David Caouette, a Biogen spokesman, in a statement. “The world today has a much greater understanding of how easily and quickly this virus can be transmitted,” he says, “and we are proud to contribute through this collaboration to the global effort to overcome COVID-19.”

By analyzing how spreading events occur, this genomic research may help health experts tailor future prevention strategies, says the Broad's MacInnis.

“It’s a cautionary tale,” she says, “as we go forward and begin to open our communities, our workplaces and schools.”