

These Lab Animals Will Help Fight Coronavirus

Scientists are ramping up the breeding of lab mice as well as the testing of primates and other animals, but it all takes time.

Laboratories around the world are racing to breed stocks of transgenic mice, and testing the susceptibility of other animals to infection with the virus that causes Covid-19.



Credit: Jochen Tack/Alamy

By James Gorman

Published March 14, 2020

Updated March 15, 2020, 12:18 a.m. ET

Among the many lessons of the coronavirus pandemic is how close humans are to the rest of the animal kingdom. We get diseases from other animals, and then we use more animals to figure out how to stop the diseases. As research ramps up treatments and vaccines, animals are crucial to fighting the pandemic.

There are different animals at each end of the pandemic, of course. The new disease almost certainly began with a bat virus, scientists agree. That virus probably passed through another animal, perhaps pangolins, on its way to humans.

But the animals that scientists will depend on in the lab are mice, first of all, and then perhaps ferrets or hamsters or monkeys. Around the world, different laboratories are racing to breed stocks of mice genetically engineered for research and testing the susceptibility of other animals to infection with the virus that causes Covid-19.

There are, of course, many objections to animal testing, particularly when it comes to primates, but researchers are deeply concerned about the

hazards to humans of treatments or vaccines that have not been tried on other animals first.

No single kind of animal will serve all test purposes and scientists have several criteria for what makes an animal useful in testing therapies and vaccines for effectiveness.

First, it must be susceptible to infection, and not all animals are. Despite the quarantining of one dog in Hong Kong, with a “weak positive” test for coronavirus, various health agencies are not taking a single, ambiguous result as evidence for concern. Advisories state there is no evidence yet that pets are susceptible to the disease.

Get an informed guide to the global outbreak with our daily coronavirus newsletter.

And even when laboratory animals are susceptible to infection, that doesn’t mean they get sick. “Most of them, they don’t care at all that they’re infected,” said Dr. Stanley Perlman, a microbiologist at the University of Iowa who developed a mouse in 2003 that was susceptible to infection with the SARS virus. It is called the hACE2 mouse.

If an animal doesn’t get sick from the infection, its use is limited, because testing treatment effectiveness requires observing whether the treatment stops the symptoms.

The best laboratory animal would not only get infected and get sick, but get sick in the same way that humans do, showing a similar course of disease. Then a test would give the most information.

Dr. Perlman pointed out that the hACE2 strain of mice susceptible to SARS got sick, “but developed a brain disease” in addition to other symptoms. A new study from China, not yet peer-reviewed, suggests that these mice do get infected with the new pandemic virus, which is called SARS-CoV-2, and develop mild pneumonia. The paper made no mention of the virus affecting the brain.

This strain of mice will be used in some of the first laboratory experiments. But first it is necessary to breed them. Like many other genetically engineered mice varieties, scientists don’t keep live colonies on hand. Instead the mice’s frozen sperm and embryos are kept ready.

The hACE2 mice were put on ice when the SARS outbreak stopped in the early 2000s. Chien-Te Tseng at the University of Texas Medical Branch, who independently developed an hACE2

mouse, is now building up a colony from frozen embryos in his lab. Mice have a three-week gestation period, or pregnancy, and take eight weeks to reach sexual maturity.

Dr. Perlman is not rejuvenating the strain himself. He sent 16 vials of frozen sperm to the Jackson Laboratory in Maine, one of the biggest breeders of laboratory animals, so they can ramp up their production.

They hope to have mice ready for distribution, at cost, by May, according to Cat Lutz, director of the mouse repository, with responsibility for thousands of strains of mice, including the hACE2.

The advantage of this strain is that it has a human receptor on its cells called an ACE2 receptor, thus its name. That allows it to be infected with SARS and the new coronavirus, which both target that receptor as they try to invade cells.

“There’s a huge demand,” Dr. Lutz said, “not only in the United States, but globally.”

Dr. Lutz said that researchers at the Jackson Laboratory will also be investigating other ways to make mice more susceptible to the new coronavirus.

“There’s never only one mouse model that we use.” For diabetes she said, “we have eight different models that we’ll look at depending on the answer that we want to ask. And I think the same is going to be true in this circumstance as well.”

Dr. Michael Diamond, in infectious disease specialist at Washington University in St. Louis, is also planning to do research with the hACE2 mouse, and other strains.

He said that although mice take time to breed, creating a supply of them is still quicker than using larger animals. Mice, he said, may help scientists “to sort of winnow down some of the candidates” for vaccines.

Dr. Diamond also said that groups around the globe are pursuing many of the same goals. At first it might seem redundant, but because there are so many unanticipated problems that arise in vaccine and treatment tests, redundancy is a feature of the scientific process rather than a drawback.

Inevitably, he said, vaccine and treatment researchers will move to other animals, perhaps hamsters and ferrets, but certainly monkeys, which

are most likely to replicate how the disease progresses in humans. All work with the live virus takes place in level 3 biosecure labs, Dr. Diamond said.

Dave O’Connor, a pathologist at the University of Wisconsin, Madison, is working with colleagues to test the usefulness of monkeys in the study of coronavirus treatments. He said that a Chinese group had already published some data on rhesus macaques and he had heard that more results from other labs around the world would be coming soon.

Those results would be on the suitability of primates for laboratory tests, not on immediate cures. “This is not the movie ‘Contagion’ where there will be a magic discovery in a monkey that allows everyone to recover immediately,” he said.

He added that, “We are potentially going to be dealing with this for a really long time and need to come to better terms with that.”