As Ebola continues to rage in three West African countries—and projections for the epidemic’s growth look increasingly dire—health officials are hoping they will soon have an additional tool to fight the disease: an easy-to-use, fast, and inexpensive diagnostic test for the responsible virus. Several teams are working on prototype kits—small disposable devices resembling home pregnancy tests—that use just a few drops of blood from a fingertip jab and can be carried easily to remote villages or on door-to-door screening campaigns. At least two of the potential diagnostics will undergo their first field trials in Guinea and Sierra Leone this fall.

Rapid detection of infections would be a huge help in applying the tried-and-true methods that have contained every other Ebola outbreak so far: Identify and isolate infected people quickly enough that they don’t pass the virus along to new victims. Ebola isn’t easy to spot early in an infection as its symptoms, such as high fever, muscle and abdominal pains, and vomiting, are the same as those of other more common diseases such as malaria and cholera.

Current diagnostic tests take several hours at least, and sometimes days. Clinics—and the teams that trace patients’ contacts at risk of infection—rely on a molecular test that detects Ebola virus genes in blood using the polymerase chain reaction (PCR). The test is reliable and accurate, but it requires a blood sample taken by needle and secure transport to a laboratory with a steady supply of electricity, PCR machines, and lab workers equipped to handle highly infectious samples and to run the machines.

That complex process causes some major problems. Suspected patients are often crowded together in makeshift wards, waiting for test results, which means uninfected people may inadvertently become exposed to Ebola. If a suspected case happens very far from the nearest diagnostic facility, it can take days before samples reach the lab and results return.

One of the new tests comes from a company called Senova in Weimar, Germany, which sent 2000 sample kits to Guéckédou, Guinea, earlier this month, where they are being run in parallel to the standard PCR

**INFECTION DISEASES**

**Testing new Ebola tests**

Identifying infections more quickly and easily could help slow the epidemic

By Gretchen Vogel

members of the European Mobile Laboratory Project use PCR tests in Guéckédou, Guinea.
Antibody-based diagnostics are usually not as sensitive as PCR tests, which can copy and detect the tiniest amounts of virus. But even an imperfect test can be helpful, Garry says. It might not be reliable enough to definitively diagnose individuals, he says, but could be used as a screening tool in hard-to-reach villages. “If you test 10 people and none show up positive, you can move on to the next village,” he says.

Rapid diagnostic tests could also be helpful in screening patients entering non-Ebola health centers or travelers at airports, says Pierre Formenty of the World Health Organization (WHO) in Geneva, Switzerland. He says WHO is working to develop an “emergency evaluation mechanism” for new diagnostic methods.

If it turns out that the current version of the Senova test doesn’t work well enough, finding ways to improve it could take months, says Hans Hermann Söffing, owner of Senova; even getting the prototypes to Guéckédou can take 3 or 4 weeks, he says. Once optimized, however, the tests are relatively easy to produce; Senova could potentially produce thousands per day, he says. Corgenix’s tests would probably cost between $1 and $2 each, Garry says.

In the short term, WHO and others are focused on increasing the number of PCR-based labs. While three labs in Guinea are meeting current needs, Formenty says, additional labs are needed in Liberia and Sierra Leone, especially in Monrovia and Freetown, respectively, the hard-hit capital cities.

They will need more staff as well. The European Mobile Laboratory Project, which has established diagnostic facilities in three countries, recently handed its lab in Nigeria over to Nigerians, says Stephan Günther of the Bernhard Nocht Institute for Tropical Medicine in Hamburg, Germany, who helps run the project. European scientists still run the labs in Guinea and Liberia, but they can use reinforcements, Günther says. Special virology expertise isn’t required; with 2 weeks of training, “there are thousands of people” who could learn to run the PCR machines safely, he says.

IMMUNOLOGY

Metabolic shift may train immune cells

BLUEPRINT project studies epigenetics of various blood cells

By Elizabeth Pennisi

The adaptive immune system, which employs the body’s T and B cells, is clearly pretty smart—it targets a pathogen with exquisite specificity and can retain a memory of fighting a microbe long ago. But don’t call the innate immune system, which recognizes general features of pathogens, stupid. Immunologists are starting to recognize that cellular components of this first line of defense also learn from past battles.

As part of a large-scale program to understand key controllers of gene activity in blood cells, Mihai Netea has now found clues to what may make some innate immune cells, monocytes and macrophages, smarter than once believed. On page 1579, the immunologist from Radboud University Medical Center in Nijmegen, the Netherlands, and his colleagues also suggest a potential way to rev up the body’s innate

Senova’s prototype rapid diagnostic for Ebola virus is being tested in Guinea.
Testing new Ebola tests
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