

hybridization. That's because the surviving partner of a wolf pair will seek a new mate—which could be a coyote. (Killing sterilized coyotes compounds the problem, because it opens a coyote territory to fertile newcomers.) The number of red wolf deaths continues to rise. Sometimes, there is evidence of foul play, such as the removal of a radio collar. Concerned, the agency has stopped reporting the location of wolf packs.

The politics of hunting intensified in July 2013, when the North Carolina Wildlife Resources Commission (NCWRC) allowed nighttime coyote hunting, including in the red wolf recovery area (see map, p. 1548). Environmentalists sued, and, this past May, a judge blocked nighttime hunting, pending a trial next year. The judge also prohibited most daytime coyote hunting, citing the danger to red wolves. Less than 3 weeks later, NCWRC Director Gordon Myers asked FWS to launch an “immediate” review of the recovery program. Myers also prohibited the agency from sterilizing and releasing any more coyotes “due to potential for impacts to private landowners and native wildlife.” (Others note that this policy may backfire by leading to more coyotes.) The change will be “absolutely catastrophic” to wolf recovery, Chamberlain predicts.

The review is being conducted by the nonprofit Wildlife Management Institute's field office in Kentucky. It will examine the science, management, and “human dimension” of the recovery program. Environmentalists are suspicious of the outcome: The review was announced the Friday afternoon before the Labor Day holiday, a classic gambit to avoid media coverage. And it initially only included a 2-week public comment period (since extended 2 weeks until 26 September). “They're trying to get it done in a hurry before anyone has a chance to react,” Sutherland says.

FWS expects the review to be complete by 10 October. That is surprisingly quick, many observers say. “The question for me is how you can do a 60-day assessment of a 27-year program?” says Kim Wheeler, who directs the nonprofit Red Wolf Coalition in Columbia, North Carolina. FWS says it intends to decide the future of the program in early 2015. “We absolutely don't have preconceived conclusions,” says Leopoldo Miranda, the FWS assistant regional director in Atlanta. If the agency decides the red wolf recovery plan has been a failure, Sierra Weaver, an attorney with the Southern Environmental Law Center in Chapel Hill, North Carolina, predicts that “there will be a lot of legal groups lining up to take action.” ■

## INFECTIOUS DISEASES

# Testing new Ebola tests

### Identifying infections more quickly and easily could help slow the epidemic

By Gretchen Vogel

**A**s 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.

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 ma-



Members of the European Mobile Laboratory Project use PCR tests in Guéckédou, Guinea.

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

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 be 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

procedure to determine how accurate they are. Meanwhile, researchers from Tulane University in New Orleans, Louisiana, in cooperation with Corgenix in Broomfield, Colorado, and other partners, say they could start testing a prototype rapid diagnostic test as soon as early October in Sierra Leone.

The Corgenix test, based on a test for Lassa fever from the same company, allows a health worker to collect a blood sample directly from a pricked finger onto a pad on one end of a diagnostic test strip. A chemical solution is applied to disinfect the sample and prepare it for the test. The sample then travels through the pad, which separates blood components, and onto the strip itself, which is made of special paper containing dye-tagged antibodies that latch on to a specific Ebola virus protein, if present. As the sample travels farther up the strip, a second antibody binds to the antibody-virus pair, and a dark line appears on the strip, indicating infection.

In Senova's test, a health care worker collects a blood sample from a fingerprick using a minipipette, then mixes the blood with the disinfecting chemical solution before applying it to the test strip; otherwise, the tests are very similar.

Multiple factors influence how well the tests work: the design of the antibodies, the buffer solution, "even what kind of glue you use to stick [the tests] together," says Robert Garry, a virologist at Tulane who is helping coordinate the project with Corgenix. "They look simple, but they're pretty sophisticated devices." Senova says it expects to have early results of its test's performance in 2 to 3 weeks. Researchers hope the tests will be very sensitive as well as very specific—meaning they miss very few Ebola cases, while also producing almost no false positives.

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 Söfing, 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 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

**T**he 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.