Scientists probe DNA of E. coli for outbreak clues

June 13 2011, By MARIA CHENG , AP Medical Writer

(AP) -- Scientists are quickly combing the DNA of the killer bacteria behind the world's worst E. coli outbreak to find clues about how to treat patients and prevent future epidemics.

So far, one strain from a German patient has been sequenced by Chinese and German scientists. While the genetic information is preliminary, experts say there are a few hints about where the bacteria came from and why it might be so lethal.

The E. coli causing Europe's massive outbreak is likely the product of another strain first detected a decade ago in Germany, but with some dangerous mutations, experts say. German investigators have declared the outbreak was caused by contaminated sprouts from an organic farm in northern Germany. So far, the bug has killed at least 35 people and sickened more than 3,000, including several hundred who have developed life-threatening kidney failure.

Flemming Scheutz, head of the World Health Organization's Collaborating Centre laboratory in Denmark, said the strain is particularly good at picking up new genes. Because E. coli is constantly evolving, it is riddled with genes swapped from other strains found in animals and humans, giving it countless opportunities to acquire something lethal.

"It's just very unfortunate that in this case, it recombined and took on these (dangerous) genes and that it happened to do it in the food chain,"

he said.

Scheutz said some previously seen related strains were also quite toxic but that scientists needed more samples to have a better understanding of how the new strain behaves. "It's like looking at a family photo with three people and the 50 others are missing," he said.

Others say the DNA sequences they've seen so far appear worrying enough.

Stephen Smith, a microbiologist at Trinity College in Dublin, said the new E. coli appears to stick to human intestines in a different way and that the bacteria might reproduce faster than other E. coli strains. More bacteria in the intestines could explain why the disease is so deadly, he said. Smith was not involved in the sequencing work.

"It could be the bacteria's genes are causing it to produce more toxin, which may affect patients differently," he said. The toxin usually targets the kidney, triggering a severe E. coli complication. But in the European outbreak, many of those patients have also suffered from neurological problems including paralysis.

Frederick Blattner of the University of Wisconsin, who has analyzed the new sequence information, said the toxin released by the German E. coli seemed extremely potent.

"With other strains, it can take a million of them in your stomach to make you sick," he said. "But with this bacteria, it might be possible to be infected with much lower numbers."

Researchers have also found the E. coli bacteria has at least eight genes that make it resistant to many antibiotics.

"That could give suggestions to doctors about what treatments to select for patients," said Bicheng Yang, a spokeswoman for BGI, the Chinese laboratory that sequenced the bacteria. In Germany, many patients with the most severe form of the disease, which involves kidney failure, have been treated with dialysis and blood transfusions.

"The next step is to do further tests at the molecular level to see what drugs might work," she said. Yang added that knowing more about the bacteria's origins could help stop future outbreaks and avoid things that could speed up the mutation process.

Gad Frankel, a microbiologist at Imperial College in London, said DNA information might help scientists figure out how the bacteria sticks to certain vegetables - and then stop it before it happens. "It's possible we could develop inhibitors to prevent the interaction between E. coli and vegetables," he said, explaining a biodegradeable spray could theoretically be made to do the job.

Experts agreed that narrowing down where the new E. coli came from was key to averting future epidemics. "The evolution of E. coli just happens when bugs get together," Smith said. "We can't stop evolution, but if we can learn today how and where it happens, we might be able to save lives in the future."

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