

E. coli bacteria migrating between humans, chimps in Ugandan park

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Tony L. Goldberg, a professor of veterinary pathobiology, with anesthetized Red Colobus monkey in Kibale National Park, Uganda. Credit: Photo courtesy of Tony L. Goldberg

Scientists from the University of Illinois at Champaign-Urbana have found that people employed in chimpanzee-focused research and tourism in a park in western Uganda are exchanging gastrointestinal bacteria – specifically *Escherichia coli* – with local chimpanzee populations. And some of the *E. coli* strains migrating to chimps are resistant to antibiotics used by humans in Uganda.

Their study will appear in the April 2007 issue of *Biological Conservation* and is available now on the journal's Web site.

Other studies have found bacterial exchanges between humans and non-human primates – particularly in areas where the animals are known to frequent garbage piles near human settlements. But this is the first study to document the exchange of *E. coli* between humans and chimps in a protected wildlife area. It is also the first to find antibiotic-resistant strains in chimpanzees in Africa.

"Antibiotic resistance has traditionally been associated with two factors: indiscriminate and over-prescription of antibiotics by physicians in the developed world and the inclusion of antibiotics in animal feed in the developed world," said Tony L. Goldberg, a professor of veterinary pathobiology and the principal investigator of the study. The new findings, Goldberg said, show that over-the-counter sales of antibiotics for human consumption can also have an impact on wildlife.

The research team, which included researchers from Makerere University in Kampala, Uganda, and McGill University in Montreal, examined two of 10 known communities of chimpanzees living in Kibale National Park, Uganda. One of the two chimp groups has been the focus of two decades of research by international teams of scientists. The other is regularly visited by employees of a local tourism venture.

Goldberg's team compared strains of *E. coli* in the chimps to those of the Ugandans employed in research and tourism in the park.

The team also analyzed samples from people living in a village 5 kilometers from the research site and 25 kilometers from the tourism station. People in the village had no known contact with the chimps.

The team collected 250 *E. coli* isolates from 25 humans and 23 chimpanzees. Of these, 89 unique genotypes (strains) of *E. coli* were found.

The *E. coli* strains from the chimps were more like those of the humans working in the park than like humans living in the village.

"This expands our notion of the situations in which people and chimps can exchange microbes," Goldberg said. "Habitat overlap, even without direct contact between people and primates, is sufficient for the exchange to occur."

The further finding that humans had transferred some antibiotic resistant strains to chimps "was the smoking gun," Goldberg said. More than 81 percent of the humans and 4.4 percent of the chimps studied were found to harbor at least one *E. coli* isolate that was clinically resistant to an antibiotic. Antibiotics are used frequently in human populations in this region of Uganda, Goldberg said, but antibiotics have never been used in local wildlife, so the antibiotic-resistant bacteria in chimps clearly originated in humans.

Goldberg said it was not clear whether the exchange of bacteria was the result of direct or indirect (environmental) association between the chimps and humans working in the park. Both make use of local streams and other environmental features.

Regardless of the route of transmission, it places both at risk, Goldberg said.

"We're as concerned about potential effects on human health as on animal health," he said.

He noted that the exchange of microbes between non-human primates and humans is not new. Two deadly viruses, HIV and Ebola, are believed to be linked to chimpanzees and other non-human primates. Human diseases also pass to monkeys and apes, with equally dire consequences: Pneumonia, respiratory disease, scabies and a polio-like virus have

caused epidemic mortality in chimpanzees in some African locales.

Source: University of Illinois at Urbana-Champaign

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