

## **Cigarettes harbor many pathogenic bacteria: Study**

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"We were quite surprised to identify such a wide variety of human bacterial pathogens in these products," says lead researcher Amy R. Sapkota, an assistant professor in the University of Maryland's School of Public Health. Credit: University of Maryland

Cigarettes are "widely contaminated" with bacteria, including some known to cause disease in people, concludes a new international study conducted by a University of Maryland environmental health researcher and microbial ecologists at the Ecole Centrale de Lyon in France.

The research team describes the study as the first to show that "cigarettes themselves could be the direct source of exposure to a wide array of potentially pathogenic microbes among smokers and other people



exposed to secondhand smoke." Still, the researchers caution that the public health implications are unclear and urge further research.

"We were quite surprised to identify such a wide variety of human bacterial pathogens in these products," says lead researcher Amy R. Sapkota, an assistant professor in the University of Maryland's School of Public Health.

"The commercially-available cigarettes that we tested were chock full of bacteria, as we had hypothesized, but we didn't think we'd find so many that are infectious in humans, explains Sapkota, who holds a joint appointment with the University's Maryland Institute for Applied Environmental Health and the Department of Epidemiology and Biostatistics.

"If these organisms can survive the smoking process—and we believe they can—then they could possibly go on to contribute to both infectious and chronic illnesses in both smokers and individuals who are exposed to environmental <u>tobacco smoke</u>," Sapkota adds. "So it's critical that we learn more about the bacterial content of cigarettes, which are used by more than a billion people worldwide."

The study will appear in an upcoming edition of the journal <u>Environmental Health Perspectives</u> and the pre-copyedited manuscript has been posted online:

http://www.ehponline.org/members/2009/0901201/0901201.pdf

The researchers describe the study as the first snapshot of the total population of bacteria in cigarettes. Previous researchers have taken small samples of cigarette tobacco and placed them in cultures to see whether bacteria would grow. But Sapkota's team took a more holistic approach using DNA microarray analysis to estimate the so-called bacterial metagenome, the totality of bacterial genetic material present in



the tested cigarettes.

Among the study's findings and conclusions:

- Commercially-available cigarettes show a broad array of bacterial diversity ranging from soil microorganisms to potential human pathogens;
- The is the first study to provide evidence that the numbers of microorganisms in a cigarette may be as "vast as the number of chemical constituents;"
- Hundreds of bacterial species were present in each cigarette, and additional testing is likely to increase that number significantly;
- No significant variability in bacterial diversity was observed across the four different cigarette brands examined: Camel; Kool Filter Kings; Lucky Strike Original Red; and Marlboro Red;
- Bacteria of medical significance to humans were identified in all of the tested cigarettes and included *Acinetobacter* (associated with lung and blood infections); *Bacillus* (some varieties associated with food borne illnesses and anthrax); *Burkholderia* (some forms responsible for respiratory infections); *Clostridium* (associated with foodborne illnesses and lung infections); *Klebsiella* (associated with a variety of lung, blood and other infections); and *Pseudomonas aeruginosa* (an organism that causes 10 percent of all hospital-acquired infections in the United States).

"Now that we've shown that a pack of cigarettes is loaded with bacteria, we will conduct follow-up research to determine the possible roles of



these organisms in tobacco-related diseases." Sapkota says.

For example, do cigarette-borne bacteria survive the burning process and go on to colonize smokers' respiratory systems? Existing research suggests that some hardy bacteria can be transmitted this way, the researchers say. This might account for the fact that the respiratory tracts of smokers are characterized by higher levels of bacterial pathogens. But it's also possible that smoking weakens natural immunity and the bacteria come from the general environment rather than from <u>cigarettes</u>. Further research will be needed to determine the possible health impacts of cigarette-borne <u>bacteria</u>.

Source: University of Maryland (<u>news</u> : <u>web</u>)

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