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Society for Risk Analysis

**New Research Finds Fetal, Infant Risk from Listeria Higher than Previously Reported**  
*Study finds Listeriosis occurs at lower exposure levels than previous research indicated*

A new study shows the risk for severe effects of exposure to *Listeria monocytogenes* among susceptible populations may occur at doses lower than suggested by previous studies. The risk of fetal or infant mortality among pregnant women who consume food containing one million cells of the food-borne pathogen *Listeria monocytogenes* in soft cheeses and other foods is estimated at about 50 percent, suggesting five stillbirths potentially could occur when ten pregnant women are exposed to that amount. A previous risk assessment estimated more than 10 trillion cells would result in stillbirths to 50 percent of pregnant women exposed.

“We’re not saying there’s a new epidemic here, we’re suggesting we’ve come up with a more accurate method of measuring the risk and how this deadly bacteria impacts humans, especially the most medically vulnerable among us,” said Mary Alice Smith, Ph.D, of the University of Georgia, a study co-author. When estimates are extrapolated from data in tests on laboratory animals, it showed “*Listeriosis* is likely occurring from exposure to lower doses than previously estimated,” confirming *Listeria* continues to be an important public health concern. The analysis also “shows studies using animal test subjects with physiologies more comparable to humans are more promising for future pathogen research endeavors.”

*Listeria monocytogenes* is a bacterium sometimes found in soft cheeses made from unpasteurized milk and in processed, ready-to-eat foods such as deli meats, smoked seafood, and raw foods. The pathogen also has been found in pasteurized and refrigerated foods, such as pasteurized fluid milk and soft-ripened cheeses. The Centers for Disease Control and Prevention (CDC) has estimated approximately 2,500 cases of *Listeriosis* occur annually in the United States, with about 500 cases resulting in death. In 2000, *Listeria* exposure resulted in a higher rate of hospitalization than any other food-borne pathogen and more than one-third of reported deaths from food pathogens, the CDC says.

Although sickness is rare among healthy individuals, *Listeriosis* can lead to severe health consequences in medically at-risk populations. The disease primarily affects the elderly, fetuses or newborns, and individuals with compromised immune systems. About one-third of the annual cases of *Listeriosis* involve fetuses or newborns. Women can become infected anytime during their pregnancy but most cases are reported in the third trimester. The infected pregnant women may have no symptoms or experience only a mild, flu-like illness but pass the disease to their fetuses. In

the first trimester, Listeriosis may result in spontaneous abortion. In later stages of pregnancy, the result may be stillbirth, premature delivery or birth of a critically ill newborn.

The study, “Risk of Fetal Mortality After Exposure to *Listeria Monocytogenes* Based on Dose-Response Data from Pregnant Guinea Pigs and Primates,” was conducted by five researchers at the University of Georgia in Athens: Denita Williams, Ph.D and Mary Alice Smith, Ph.D, along with Jennifer Castleman, Chi-Ching Lee, and Beth Mote. Results are published in the November 2009 issue of *Risk Analysis*, which is published by the Society for Risk Analysis. The research was funded by the Center for Food Safety and Applied Nutrition of the U.S. Food and Drug Administration (FDA), the Food Safety Inspection Service of the U.S. Department of Agriculture (USDA), and the American Meat Institute Foundation.

The research team conducted a risk assessment focusing on consumption of contaminated Mexican-style soft cheese consumed by a woman in her third trimester of pregnancy. Using non-human primates and guinea pigs for their models, the researchers determined among a number of factors the level at which half of the primates or guinea pigs had stillbirths and then compared that data with estimates for human exposure to soft cheese. Ten of 33 pregnant primates exposed to a single dose of *Listeria* experienced stillbirths. Using these primate data, the new model predicted 50 percent stillborn births among pregnant women, at a dose similar to that estimated from an outbreak of Listeriosis among pregnant women. Exposures were measured using the FDA’s estimates for the number of *Listeria*-contaminated servings consumed by pregnant women. The dose of *Listeria* required for infection and onset of adverse effects was found to be more similar between humans, primates and guinea pigs than previous dosages used in government research that were adjusted from a mouse study.

### **Listeria Infection Impacts, Symptoms:**

The most severe symptoms usually occur in people with predisposing conditions or susceptible populations, including fetuses or the immune compromised. Following invasion of intestinal tissue, *Listeria* most often spreads to the blood, liver, placenta, or the central nervous system. The incubation period before individuals become ill can be anywhere from a few days for gastroenteritis, to two to three weeks for meningitis and up to three months during pregnancy. If the infection spreads to the nervous system, symptoms such as headache, stiff neck, confusion, loss of balance, or convulsions can also occur.

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Note to editors: The complete study is available upon request from Lisa Pellegrin/Steve Gibb or at: <http://www3.interscience.wiley.com/cgi-bin/fulltext/122662318/HTMLSTART>