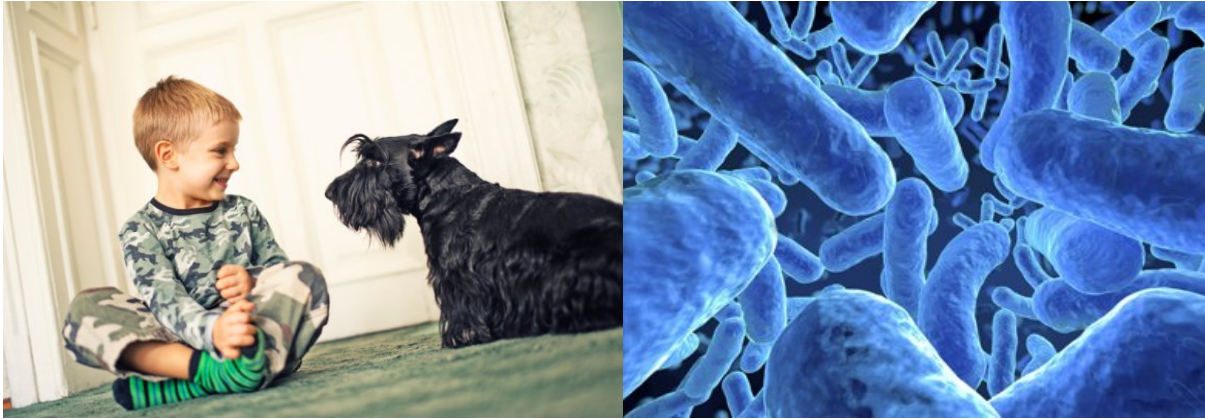


Research Shows How Household Dogs Protect Against Asthma, Infection

By [Jeffrey Norris](#) on December 16, 2013



Children's risk for developing allergies and asthma is reduced when they are exposed in early infancy to a dog in the household, and now researchers have discovered a reason why.

Exposure of mice to dust from houses where canine pets are permitted both indoors and outdoors can reshape the community of microbes that live in the mouse gut — collectively known as the gastrointestinal microbiome — and also diminish immune system reactivity to common allergens, according to a new study by researchers led by [Susan Lynch](#), PhD, associate professor with the Division of Gastroenterology at UC San Francisco, and Nicholas Lukacs, PhD, professor with the Department of Pathology at the University of Michigan.

The study, funded by the National Institute of Allergy and Infectious Diseases (NIAID), is published online this week in the *[Proceedings of the National Academy of Sciences](#)* (PNAS) and involves a multi-disciplinary group of researchers from UCSF, the University of Michigan, Henry Ford Health System and Georgia Regents University.

Dust Protects the Lungs' Airways

The results were obtained in studies of mice challenged with allergens after earlier exposure to dust from homes with dogs, but the results also are likely to explain the reduced allergy risk among children raised with dogs from birth, according to the study leaders.

In their study, the scientists exposed mice to cockroach or protein allergens. They discovered that asthma-associated inflammatory responses in the lungs were greatly reduced in mice previously exposed to dog-associated dust, in comparison to mice that were exposed to dust from homes without pets or mice not exposed to any dust.

Among the bacterial species in the gut microbiome of these protected mice, the researchers homed in on one, *Lactobacillus johnsonii*. When they fed it alone to mice, they found it could prevent airway inflammation due to allergens or even respiratory syncytial virus (RSV) infection. Severe RSV infection in infancy is associated with elevated asthma risk.

The level of protection with this single species was less than that obtained with the full complement of dust microbes from dog owners' homes, indicating that other, environmentally sourced bacterial species probably are necessary for full airway protection, Lynch said.

This result suggests that *Lactobacillus johnsonii* or other species of "good" bacteria might one day be used to reshape the gut microbiome in ways that can prevent the development of asthma or allergies, or perhaps even to treat existing cases, she said.

Gut Microbiome's Affect on Immune System

Lynch's own work and research by several others in the field has led her to become convinced that "the composition and function of the gut microbiome strongly influence immune reactions and present a novel avenue for development of therapeutics for both allergic asthma and a range of other diseases."

The current study demonstrates that changes in the gut microbiome can have wide-reaching effects on immune function beyond the gut, at sites elsewhere in the body.

"Gut microbiome manipulation represents a promising new therapeutic strategy to protect individuals against both pulmonary infection and allergic airway disease," Lynch said.

UCSF is a leading university dedicated to promoting health worldwide through advanced biomedical research, graduate-level education in the life sciences and health professions, and excellence in patient care. It includes top-ranked graduate schools of dentistry, medicine, nursing and pharmacy, a graduate division with nationally renowned programs in basic biomedical, translational and population sciences, as well as a preeminent biomedical research enterprise and two top-ranked hospitals, UCSF Medical Center and UCSF Benioff Children's Hospital.