

'Dirty mice' could clean up immune system research, study suggests

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Scientists at the University of Minnesota have developed a new way to study mice that better mimics the immune system of adult humans and which could significantly improve ways to test potential therapeutics. Published online today in the journal *Nature*, the researchers describe the limitations of laboratory mice for immunology research and reveal the benefits of what they are calling "dirty mice."

"Standard lab mice don't reflect important features of the adult human immune system. We wanted to know whether this is because lab animals are shielded from microbes that normal mice encounter in the wild," said Stephen Jameson, Ph.D., co-senior author, professor in the Department of Laboratory Medicine and Pathology and member of the Center for Immunology, University of Minnesota. "Lab mice remain critical for basic immunology research, but it was important to find a better way to model the complex immune system of adult humans."

To do so, the group caught mice in barns or purchased them at pet stores and carefully compared their immune system to that of humans. The free-living, or dirty, mice better mirrored immune cell types and tissue distribution found in adult humans. In contrast, the immune system in lab mice which are sheltered from natural microbial exposure were more strongly matched with newborn humans.

When genetically homogenous lab mice were co-housed with dirty mice this restored more normal microbial experience and allowed the immune system of the lab mice to adapt and better recapitulate the adult human

immune system.

"This model could provide an important addition to basic research into immunology and the many biological processes and diseases that are impacted by inflammation," said David Masopust, Ph.D., co-senior author, associate professor in the Department of Microbiology and Immunology and member of the Center for Immunology, University of Minnesota. "Utilizing this model to test vaccinations and therapeutics for cancer or transplantation may better predict how these will perform in humans."

The use of standard lab mice has led to numerous breakthroughs in biomedical research, including studies that led to recent advances in cancer immunotherapy. However, this study shows the immune system in lab mice may not be fully normalized without a more complete microbial exposure. Hence these so-called dirty mice offer a substantial advance over current models, providing increased translational potential for human disease and better therapeutic models without sacrificing established and powerful research tools.

More information: Lalit K. Beura et al, Normalizing the environment recapitulates adult human immune traits in laboratory mice, *Nature* (2016). [DOI: 10.1038/nature17655](https://doi.org/10.1038/nature17655)

Provided by University of Minnesota

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