

Decline of immune system with aging may have a genetic cause

July 11 2012

Important insights that explain why our ability to ward off infection declines with age are published in a new research report in the July 2012 issue of the Genetics Society of America's journal, *Genetics*.

A team of U.S. scientists identified [genes](#) responsible for this decline by examining fruit flies – a model organism often used to study human biology in an experimentally tractable system – at different stages of their lives. They found that a completely different set of genes is responsible for warding off infection at middle age than during youth. Many of the genes identified are also present in humans, so this study opens doors to understanding genetic interactions that underlie why older people have more trouble fighting off infections than do younger people.

"We believe we have identified genes that contribute to the age-related deterioration of the immune response to infection," said Jeff Leips, Ph.D., a researcher involved in the work from the Department of Biological Sciences at the University of Maryland, Baltimore County. "Because many of the genes that we have identified also occur in humans, we hope that such knowledge will lead to new treatments to maintain immune function as we age."

To make this discovery, Leips used [fruit flies](#) of different genotypes that were derived from a natural population. Flies of each genotype were infected with bacteria at two different ages – when they were young, at an age equivalent to human teenagers, and when they were older, in what might be the equivalent to early middle age in humans. The researchers

then measured the ability of the flies to clear the bacterial infection at each age while simultaneously assessing how the expression of genes responded to infection. Genes whose variation in expression were associated with the ability to clear the infection were identified for each of the different ages at the time of infection. Surprisingly, the genes were different -- there was no overlap in the sets of genes associated with the ability to clear [infection](#) across ages.

"The notion that the genes responsible for immune function are almost entirely different in middle age than in early adulthood is tantalizing," said Mark Johnston, editor-in-chief of the journal *Genetics*. "As the average age of the U.S. population increases, understanding how to maintain strong, healthy immune systems could help many of us live longer, healthier lives."

More information: T. M. Felix, K. A. Hughes, E. A. Stone, J. M. Drnevich, and J. Leips. Age-specific variation in immune response in *Drosophila melanogaster* has a genetic basis *Genetics* July 2012 Volume 191, Issue 3. www.genetics.org/

Provided by Genetics Society of America

Citation: Decline of immune system with aging may have a genetic cause (2012, July 11)
retrieved 26 April 2024 from
<https://medicalxpress.com/news/2012-07-decline-immune-aging-genetic.html>

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