Feed that cold! New study shows that lower food intake has a negative effect on immune system

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A deer mouse (Peromyscus maniculatus). Credit: Photograph by Clint Cook, University of South Carolina; courtesy of the Peromyscus Genetic Stock Center

Researchers studying deer mice have discovered evidence to support what mothers everywhere have long suspected: the immune system needs food to function properly. In an article titled “Food Restriction Compromises Immune Memory in Deer Mice (Peromyscus maniculatus) By Reducing Spleen-Derived Antibody-Producing B-Cell Numbers,” Lynn Martin and coauthors find that reduced food intake leads to a decline in immune function in their subjects. The findings, which will be published in the May/June 2008 issue of *Physiological and Biochemical Zoology*, could have profound implications for human health.

Why immune activity is variable in many wild animals is a question that has long puzzled researchers. “Animals live different lifestyles, so they may use different types of defenses against infection depending on the situation. Perhaps this is why immune defenses vary seasonally in most species; some may be too expensive to use all the time,” Martin said, referring to previous work on Peromyscus and other small mammals and birds.

While it is known that the immune system expends energy when it gears up to fight a virus or an infection—a fever, for example—the researchers found that restricting their subjects’ diet by 30% significantly decreased the amount of available B cells, which produce antibodies and maintain immune memory. Without these cells, the immune system must relearn how to fight a threat if it reappears.

Research on the relationship between food and the immune system could have profound implications for humans. Martin and fellow researchers cite previous studies that have found that infections are “more frequent and tend to be chronic in malnourished children.” Vaccines, in order to work effectively, must provoke B cells to produce sufficient antibodies for immune memory. Previous studies have found that vaccines such as those for measles have a significantly lower rate of efficacy among the malnourished.

“A 30% restriction in food intake doesn’t affect body mass and only minimally reduces activity in deer mice, but it eliminates the long-term immune protection provided by antibodies. One wonders whether similar moderate food restriction has comparable immune effects in humans," Martin asked. Although other variables may be at work, the authors propose that for both wild animals and humans, food availability impinges on immunity and future research should determine what specific components of a diet (calories, protein, micronutrients) are responsible.

Source: University of Chicago