Testosterone key to disease transmission

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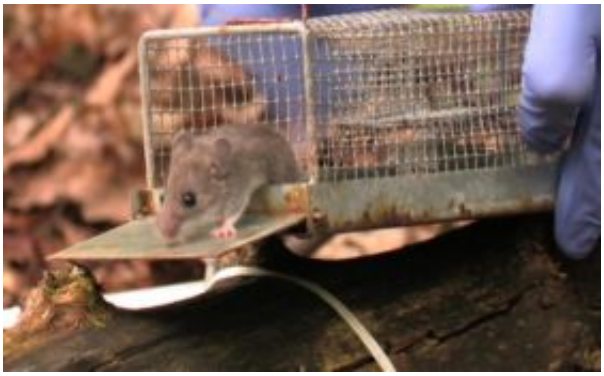

After checking it for ticks and measuring it's length and weight, researchers set a mouse free at the same location it was trapped. Photo: Amitabh Avasthi

High levels of testosterone may be a key factor in spreading disease among mice, according to biologists. The findings could help explain why males in a population are often more likely to get infected, and transmit disease.

Previous research has linked testosterone, the male sex hormone, to immune system suppression. Studies have shown that males, compared to females, experience more bouts of disease, and account for a larger share of disease transmission. However, it is not fully clear what makes males such super-spreaders of disease.

"We know that testosterone makes males more susceptible to disease," said Daniel Grear, Penn State doctoral student in ecology. "We wanted

to find out if it impacts their behavior as well and how that increases their ability to transmit disease."

Grear and his Penn State colleagues Sarah E. Perkins, postdoctoral fellow, and Peter J. Hudson, the Verne M. Willaman chair in biology and director of the Huck Institutes of Life Sciences at Penn State, investigated the effects of increased testosterone on mice behavior.

"Our plan was to raise the testosterone levels in wild mice and measure the disease risk they posed to the population," said Grear, who presented the team's findings today (Aug. 8) at the annual meeting of the Ecological Society of America in Milwaukee, Wis.

The researchers randomly treated 24 male mice trapped at five sites in Huntingdon County, Pa., with testosterone implants.

Twenty-five other male mice received sham implants, while mice at three separate sites received neither treatment. All sites were trapped twice a week for six weeks before and after treatment.

The trapping sites were innovatively positioned to represent a large grid and mice were electronically tagged so researchers could keep precise track of where the animals were being recaptured. Such a social network, Grear explained, could help provide a clear picture of how the treated and untreated mice mix on the grids over time.

Tests on recaptured mice indicated that the average number of contacts made between both males and females by mice that received the treatment -- sham and testosterone -- increased significantly increased after treatment.

In other words, all mice were mixing more when testosterone treated mice were present.

Researchers also found that all mice at the separate untreated sites made significantly less contacts with other mice during the same time that the testosterone treatment significantly increased contacts.

"These findings suggest that even if some individuals in a population have high levels of testosterone, they can impact the behavior of those around, and drive the transmission of diseases transmitted by close contact such as the respiratory pathogen bordetella," explained Grear, whose work is funded by the National Science Foundation.

Source: Penn State