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New Study

Body odour reveals malarial infection

Zurich, June 30th, 2014. **An infection with malaria pathogens changes the scent of infected mice, making those infected more attractive to mosquitos. These are the findings of a team of researchers from ETH Zurich and Pennsylvania State University in a new study.**

Malaria is and remains a formidable disease that is transmitted to humans by the anopheles mosquito. The pathogen is a protozoan of the genus *Plasmodium*. If left untreated, malaria can be deadly. However, the plasmodium parasite has a problem: to complete its lifecycle, it must eventually be acquired by another mosquito, which occurs when the insect bites an infected person.

Pathogen elicits the strongest odour during reproduction phase

In a new study just published in PNAS, researchers show that whether mosquitos find the right victim to bite is not left to chance by the pathogen. Instead, the plasmodium parasite appears to manipulate its host by changing the characteristics of the infected individual's body odour, which makes the carrier more attractive to hungry mosquitos.

Mosquitos were most attracted to infected mice with a high concentration of gametocytes, the plasmodium parasite's reproductive cells, in their blood. When the mosquito consumes these cells along with the blood, a new development cycle starts in the mosquito's gut.

No unique cocktail of scent components

However, the pathogens do not appear to trigger the expression of unique scent components. The researchers were unable to find any components that existed only in infected persons. Instead the malaria pathogens alter the levels of compounds already present in the scent of uninfected individuals. "There appears to be an overall elevation of several compounds that are attractive to mosquitos," says Consuelo De Moraes, Professor of Biocommunication and Entomology at ETH Zurich.

The researchers believe it is logical that infected people smell more attractive but do not form highly specific body odours, especially given that the malaria pathogen can also have adverse effects on mosquitoes. "Since mosquitos probably don't benefit from feeding on infected people, it may make sense for the pathogen to exaggerate existing odour cues that the insects are already using for host location," says study leader Mark Mescher.

What the researchers found most surprising is the fact that the malaria infection leaves its mark on body odour for life. Even when infected mice no longer had symptoms, their body odour showed that they were carriers of the pathogen. However, not all stages of the disease smelled the same: the scent profile of the

acutely ill differs from the profile found in individuals exhibiting later stages of malaria infection.

Scent tests on humans

Although the findings obtained from mice in this study cannot be directly transferred to human malaria, they suggest that similar effects might be involved in the attraction of mosquitoes to infected people. Mescher and De Moraes are currently investigating this possibility through additional research involving human subjects in Africa.

In addition to aiding efforts to disrupt malaria transmission by mosquitoes, the researchers hope that findings from this work may also be used to develop new non-invasive diagnostic procedures that would facilitate effective screening of human populations for malaria infections, particularly in order to identify individuals who don't otherwise symptoms but remain capable of spreading the disease.

Original:

De Moraes et al. Scent of disease: Malaria-induced changes in host odors enhance mosquito attraction. PNAS Early Edition, published online 30th June 2014.

Further Information

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