

Beer consumption increases attractiveness...to mosquitoes (and other factors influencing mosquito landing preferences)

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It's a fact of life: some people are more attractive than others – even, apparently, to mosquitoes.

Experts estimate that 10-20 percent of humans have greater than average appeal – or lesser than average repellency – to mosquitoes due to an interplay of characteristics that serve as visual and chemical attractants.^(1,2) Dark colors – black, navy blue and red – and movement catch mosquitoes' attention visually. Chemically, mosquitoes are attracted to the “smell” of carbon dioxide, lactic acid, acetone and estradiol. Genetics also play a big role; twin studies have shown that identical twins tend to be similarly attractive or repellent to mosquitoes. [*PLoS One* 2015;10:e0122716]

While much is still unknown about the traits and mechanisms involved in mosquitoes' preference for certain humans, these are some of the findings from various mosquito attraction experiments over the years:

Blood type

In a study examining *Aedes albopictus* mosquitoes' landing preferences on people with different ABO blood groups, landing percent-



ages were found to be higher on subjects with type O blood compared with those with type A blood ($P = 0.02$). The explanation for this is still unclear, though researchers surmised that it may have something to do with the geographical origins of mosquitoes and the prevalence of certain blood types in those areas. [*J Med Entomol* 2004;41:796-9]

Pregnancy

Compared with their non-pregnant counterparts, pregnant women attracted significantly more *Anopheles gambiae* ($P=0.0002$) and *Mansonia spp.* ($P=0.0008$) mosquitoes. Differences noted with other mosquito species – including *Aedes aegypti*, *Culex quinquefasciatus* and *C. tritaeniorhynchus* – were only of borderline significance ($P=0.056$). There are several possible explanations for this phenomenon. Research-

ers found that the pregnant women in the study produced 21 percent more exhaled breath – and therefore release more CO₂ – than the non-pregnant women. Blood flow to the skin also increases during pregnancy, thus increasing the release of volatile substances from the skin surface and producing a larger host signature that allows mosquitoes to detect pregnant women more readily. Finally, during nighttime, pregnant women left the protection of their mosquito nets twice as frequently as did the non-pregnant women – probably to relieve their bladders – thus increasing their exposure to night-biting mosquitoes. [*Lancet* 2000;355:1972]

Type of bacteria present in the skin

In a comparison of “bacterial broths” of organisms commonly found on human skin and associated with body odor production – namely, *Bacillus subtilis*, *Brevibacterium epidermidis*, *Corynebacterium minutissimum*, *Pseudomonas aeruginosa* and *Staphylococcus epidermidis* – researchers found that the presence of corynebacteria conferred greater attractiveness to mosquitoes, while *P aeruginosa* was not attractive and even appeared to attenuate the effect of chemicals from the other bacterial species. [*PLoS One* 2010;5:e15829]

Beer consumption


An experiment compared the mosquito attractiveness of subjects before (BB) and after (AB) beer consumption, as well as before (BW) and after (AW) water consumption. Mosquito activation – the proportion of mosquitoes engaging in take-off and up-wind flight – was sig-

nificantly higher after beer consumption (by 47 percent; $P < 0.001$) compared with the BB, BW and AW activation rates. Moreover, orientation – the proportion of mosquitoes flying towards the subjects’ odors – was higher after beer consumption compared with BB, BW and AW (65 vs 50 percent, 53 and 47 percent respectively; $P < 0.001$). [*PLoS One* 2010;5:e9546]

Other factors

The American Mosquito Control Association identified other traits that may make some people more attractive than others to mosquitoes.

- Bigger people may be more attractive to mosquitoes because they present a bigger visual target and produce more chemical mosquito attractants such as CO₂ and lactic acid.
- Active or fidgety people tend to produce more CO₂ and lactic acid and may therefore be more appealing to mosquitoes. In some studies, movement increased mosquito bites by up to 50 percent.
- Smelly feet may be more attractive to certain species of mosquitoes.⁽³⁾

Further studies on what attract and repel mosquitoes would contribute to the effective management of mosquito-borne diseases such as dengue and malaria. 

Resources: (1) Heubeck E. Are You a Mosquito Magnet? Available at <http://www.webmd.com/allergies/features/are-you-mosquito-magnet>. Accessed 15 October 2015. (2) Nierenberg C. Why some people are mosquito magnets. Available at <http://www.nbcnews.com/health/why-some-people-are-mosquito-magnets-1C6437380>. Accessed 15 October 2015. (3) AMCA resources page. American Mosquito Control Association website. Available at <http://www.mosquito.org/fun-facts>. Accessed 15 October 2015.