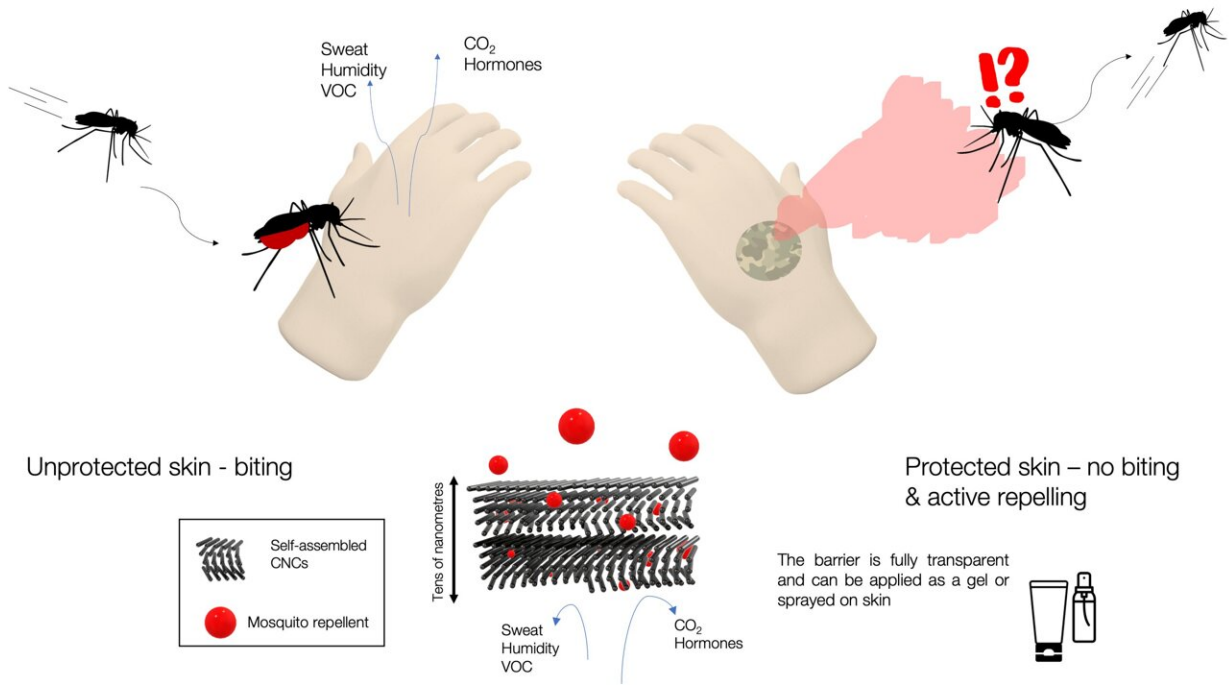
Mosquito bite prevention with cellulose nano crystals

April 12 2023



Graphical abstract. Credit: *PNAS Nexus* (2023). DOI: 10.1093/pnasnexus/pgad069

A study proposes a new way to prevent mosquito bites, based on an inexpensive and readily available biomolecule. Mosquitos spread potentially fatal diseases affecting humans, including malaria, zika, chikungunya, and yellow fever—making mosquitoes the deadliest animals on Earth.

Daniel Voignac and colleagues propose a mosquito bite prevention method based on cellulose, an abundant biological molecule, readily available in wood industry waste, as well as local food and paper waste. Treating cellulose with sulfuric acid prompts the molecule to assemble into cellulose nano crystals, which then self-assemble into strong, transparent barrier films. Mixed with water and a small amount of glycerol, the nano crystals can be applied to the skin like a gel.

In trials with live Aedes aegypti mosquitos—for which one of the authors placed his own hands in a cage with an average of 15 female mosquitos for 10 minutes—use of the cellulose nano crystal gel reduced feeding significantly, but did not seem to pose a physical barrier, suggesting the film actually functioned as "chemical camouflage," hiding the volatile organic compounds emanating from human skin that the insects use as cues to find a meal. In further tests with simulated skin, cellulose nano crystals spiked with the mosquito-repelling compound indole were the most effective at reducing "bites."

The work is published in the journal *PNAS Nexus*.

More information: Daniel Voignac et al, Mosquito bite prevention through self-assembled cellulose nanocrystals, *PNAS Nexus* (2023). DOI: 10.1093/pnasnexus/pgad069

Provided by PNAS Nexus