Breakthrough could lead to better mosquito trap

Molecules that disrupt carbon-dioxide sensors key to making cheaper, more powerful repellents

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In the biggest lab breakthrough against mosquitoes in years, scientists on Wednesday said they had identified odour molecules that baffle the bloodthirsty insects.

The molecules disrupt carbon-dioxide sensors that alert mosquitoes to exhaled breath, which signals the presence of a human nearby, the team reported.

The work could lead to revolutionary but low-cost repellents to confuse, deter or trap mosquitoes, it said.

They could be invaluable in developing tropical countries, where mosquito-borne malaria is endemic, providing an alternative to DEET, a skin repellent that is expensive, needs repeat applications and is showing worrying signs of resistance.

"These chemicals offer powerful advantages as potential tools for reducing mosquitohuman contact and can lead to the development of new generations of insect repellents and lures," said Anandasankar Ray, an assistant professor of entomology at the University of California at Riverside, who led the study. Traps for mosquitoes already exist, in the form of dry ice, gas cylinders of carbon dioxide or propane combustion. But these gadgets are too bulky and far too expensive to be used for mosquito control, especially in poor countries. Future mosquito traps, Ray predicted, could be "highly portable, convenient and easily replenishable."

Malaria claimed 781,000 lives in 2009, according to the UN's World Health Organization (WHO), which is heading efforts to distribute insecticidetreated mosquito nets and to spray reproduction sites.

About 90 per cent of malaria deaths each year occur in Africa and 92 per cent of those are children aged under five.

Other mosquito-borne diseases are dengue, which sickens around 50 million people each year, yellow fever, filariasis and West Nile virus.

Building on research on fruitflies, a common laboratory tool, Ray's team looked at three of mosquito species whose females are disease vectors: Anopheles gambiae, Aedes aegypti and Culex quinquefasciatus.

The odour molecules that they identified disrupt receptor cells for carbon dioxide located in tiny, antennae-like appendages close to the mosquito's mouth.

These receptors are activated by a whiff of carbon dioxide, triggering a signal in the brain that prompts the insect to fly upwind, following the puffs of CO2 until they reach its source. Mosquitoes also use heat sensors and sight to home in on their meal. The findings have been tested in a small-scale experiment in Kenya, using huts where alluring plumes of CO2 were released to attract mosquitoes and odour molecules were released to bamboozle them.

Mark Stopfer, a specialist at the U.S. National Institutes of Health (NIH), said the results opened up "a promising line of defence."

He added some words of caution, saying that mosquitoes were attracted to other odours in human sweat and skin. In addition, the chemicals that have been tested on insects so far have not yet been tested for safety on humans, he noted.