Extended Abstract

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Attractivity of volatile organic compounds from human skin odours to vectors of American tegumentary leishmaniasis

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Abstract:

Volatile Organic Compounds (VOCs) from skin odours may offer chemical cues for anthropophilic insects, which includes vectors of infectious diseases, such malaria, dengue, yellow fever and leishmaniasis. Indeed, the skin represents the interface between blood feeding insects and human hosts. The knowledge about the ecological aspects that involves these chemical cues and its effects on insect´s orientation can be useful information to develop strategies on these diseases control. Actually, many studies have been concerned with the influence of skin odours in the attraction/repellence behavior of mosquitoes and it has been reported that skin odours are crucial for host selection by these insects. However, very little is known about how these odours can act upon phlebotomize sandflies, vectors of leishmaniasis, which are considered neglected diseases. The present work aimed to investigate compounds from human skin odours that can be attractive to sandflies. For such purpose it was developed a sampling method for human skin odours collection and extraction, which facilitates the sampling in the field. This method was based on SPME-HS/GC-MS technique using samples of hair from legs as a matrix for volatiles extraction. Thirty three healthy male volunteers residing in an endemic area for American Tegumentary Leishmaniasis (ATL) (in the Northeast of Brazil) had samples of hair collected for VOCs identification. Forty-two VOCs were appropriately identified and eight of them (octanal, 2-phenylacethaldehyde, tetradecane, pentadecane, hexadecane, octadecane, eicosane and 6-methyl- 5-hepten-2-one) were tested in wind tunnel assays to evaluate its effects on female phlebotomine sandflies specimens. Hexane and (E)-oct-3-en-1-ol (octenol) were used as negative and positive control, respectively. All tests were performed in a transparent acrylic wind tunnel with lateral sliding doors, air flux control and at controlled temperatures. The humidity was maintained between 65–80% and a red light was used for all tests. To facilitate behavior observation, a white netting mini tunnel was placed inside the acrylic wind tunnel. A realizing chamber was placed 110 cm downwind from the odour source. Each tested VOC was delivered on a filter paper and each trial were 2 min-long. Activation and attraction behavior were recorded and at least 10 replicates were conducted for each VOC. 2-phenylacetaldehyde, 6-methylhept- 5-en-2-one, pentadecane and icosane were found to activate female phlebotomine sandflies. Only phenyl acetaldehyde, 6-methylhepten-5-en-2-one and icosane elicited attraction responses. Octanal and octadecane didn´t evoke any significant response. According to these results, phenyl acetaldehyde, 6-methylhepten-5-en-2-one and icosane can be considered suitable candidates for attractiveness studies in the field, focusing on the development of strategies for human beings protection against phlebotomine sandflies bites and thus against leishmaniasis. Volatile compounds emanated from human skin were studied by gas chromatography/mass spectrometry (GC/MS). The purpose of this study was to identify compounds that may be human-produced kairomones which are used for host location by the mosquito, Aedes aegypti (L.). The procedure used to collect volatiles was chosen because of prior knowledge that attractive substances can be transferred from skin to glass by handling. Laboratory bioassays have shown that the residuum on the glass remains attractive to mosquitoes until the compounds of importance evaporate. The sampling and analytical procedures modeled the above-cited process as closely as possible except that the evaporation of compounds from the glass surface was accomplished by thermal desorption from glass beads in a heated GC injection port. This made possible the solvent less injection of volatiles onto the column. The compounds were cryo focused on the head of the column with liquid nitrogen prior to GC separation. A single stage of mass spectrometry on a triple quadrupole instrument was used for mass analysis. A combination of electron ionization and pulsed positive ion/negative ion chemical ionization modes on two different GC columns (one polar, one relatively nonpolar) was used to identify most of the 346 compound peaks detected by this technique.

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