Identification of potential molecules to repel the Chagas disease vector, *Rhodnius prolixus*, using reverse chemical ecology

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INTRODUCTION: The reduviidae bug *Rhodnius prolixus* is a major vector of American trypanosomiasis (Chagas disease), a chronic parasite infection caused by *Trypanosoma cruzi* which affects 7-8 million people worldwide. Blocking contact between human and vector-borne diseases is a serious challenge that must be overcome. Olfaction is an intricate mechanism that permits insect identified semiochemicals exhaled by their host. The odorant receptors (OR), which belong to seven-transmembrane proteins family, mediates most of the insect olfaction responses. Surprisingly, *R. prolixus* is not sensible to repellents available commercially.
OBJETIVE: The main goal of this study was to identify compounds that can be repellent or attractant for this species.
MATERIALS AND METHODS: Using a combination of bioinformatics, heterologous gene expression, quantitative/semi-quantitative PCR and bioassays, OR expressed in antennae of *R. prolixus* were functionally characterized.
RESULTS: Firstly, the 106 *RproOR* candidates were screened against the ORs from other haematophagous insects to discovery structural similarity that might be related with receptor functions. Thus, were chosen 20 *ORs*, of these 6 *OR*, including the co-receptor *ORCO*, were well transcripted to cRNAs and microinjected into *Xenopus laevis* oocytes. A panel of 100 compounds was tested. Curiously, only *RproOR8* showed dose-dependent electrophysiological response to 4 ligands. The qPCR showed that *RproOR8* is highly expressed in male antennae. Interestingly, bioassays showed that the four compounds (1 alcohol and 3 ketones) provoked repellence behavior in the tested insects ($p<0.05$).
CONCLUSIONS: These data demonstrate that reverse chemical ecology is a powerful tool to discover target molecules for the development of repellents aimed at reducing transmission of vector-borne disease.

Key words: odorant receptor, *Rhodnius prolixus*, repellent, chemical ecology
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