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CANDIDATE MOLECULAR TARGETS FOR DEVELOPING NOVEL TICK CONTROL AGENTS

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Abstract The major disease vectors ticks not only occur in rural areas, but are also increasingly encountered in urban areas, with similar prevalence of infection. The dominate way against tick-borne diseases is preventing tick bites by using repellents or acaricides, due to the difficulty in developing vaccines to the great diversity of pathogens carried by ticks. However, most of the currently available tick control agents are synthetic chemicals, which raise concerns including potential health and environmental hazards, the off-target effects to beneficial species and the increasing resistance in vector populations. Therefore, action is needed to proactively develop sustainable control agents. Ticks are heavily dependent on their chemosensation (olfaction and gustation) to find the hosts, feed and reproduce, and chemosensory receptor genes play a central role in these processes. However, the functions of tick chemosensory receptor genes remain unknown. In our project, we explore tick chemosensory receptor genes as the rational molecular targets to be used to screen novel natural tick control agents. By comparative transcriptome analysis of different body parts of male and female ticks, as well as the nymphs, we have identified candidate receptor genes that are enriched in their chemosensory appendages. Further functional characterization will reveal the receptors responsive to key chemical stimuli including host odorants, repellents, and pheromones. These will be the molecular targets to find the natural compounds that interact with the receptors, thus block the attraction to hosts, induce greater repellency, or disrupt the pheromone communications.

Key words disease vector, chemosensory, receptor genes, pheromones