Expression of glycan biosynthetic enzymes and glycan-binding proteins in Ixodes ricinus tick life stages

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Pathogens transmitted by the castor bean tick (Ixodes ricinus) are an emerging threat to public health. Glycoproteins and lectins are known to play a role in tick innate immunity and, additionally, pathogens' interactions with glycoproteins enable colonization of both the tick vector and mammalian host. Thus, the understanding of glycosylation in different life stages could shed light on the tick-pathogen interactions. In this study, we identify transcripts involved in glycan biosynthesis as well as transcripts of lectins and other genes containing sugar binding domain (SBD) in transcriptomes derived from different life-stages of the I. ricinus. We searched the tick stage specific transcriptome assemblies using candidate sequences for the selected SBD proteins and glycosylating enzymes from related arthropod species as query. We identified enzymes underlying the process of N-glycan sialylation which is otherwise attributed to the glycosylation specific for complex glycans in vertebrate lineage. Moreover, we found some of these transcripts specific to early stages of tick development. Thus we suggest their role in the mechanism of molecular mimicry in tick and we make conclusions on their significance for tick development. We also found I. ricinus homologues of lectins integrated in an innate immune network and recognizing specific glycan structures on the surface of invading pathogens as described in other blood feeding arthropods. Collectively, our work extends the knowledge background about the role of carbohydrate-mediated interactions in the tick innate immunity being challenged by the tick parasitic life style and we also provide more insight into the role of glycosylation in a tick life cycle and development.