V 39 Targeting tick subolesin for the control of tick infestations and pathogen transmission

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Ticks are important ectoparasites of humans, domestic and wild animals. Ticks and transmitted pathogens affect human and animal health and economically impact animal production worldwide. Control of tick infestations has been primarily by application of acaricides, which has resulted in selection of resistant ticks and environmental pollution. Tick vaccines have proven to be a feasible tick control method that offers a cost-effective, environmentally friendly alternative to the use of acaricides. Commercial tick vaccines for cattle based on the *Rhipicephalus* (*Boophilus*) *microplus* Bm86 gut antigen reduced tick infestations on cattle and the intensity of acaricide usage, and it increased animal production and reduced transmission of some tick-borne pathogens. Subolesin was discovered as a tick-protective antigen in *I. scapularis*. Use of subolesin in RNA interference (RNAi) and vaccination studies showed that targeting subolesin had a profound effect on tick biology and caused degeneration of tick tissues (gut, salivary glands, reproductive tissues, and embryos). In subsequent studies, subolesin was found to control tick gene expression, impact the innate immune response, and decrease the vector capacity of ticks for *Anaplasma marginale* and *A. phagocytophilum*. Herein, we discuss recent advances of our groups towards targeting tick subolesin for the development of new vaccines for the control of tick infestations and the transmission of pathogens. Critical research directions include (i) characterization of subolesin function and genetic diversity, (ii) testing subolesin efficacy for the control of other hematophagous arthropod vectors, (iii) development of transmission-blocking vaccines, and (iv) new vaccine formulations.