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Vitellogenin binds to cells for shielding effects in the honeybee

Heli Havukainen

A dramatic increase in protein called vitellogenin is a hallmark of changes that prepare the honeybee for wintertime or drought. Under such stressful periods, the honeybee workers must extend their lifespan until favorable conditions return. Vitellogenin is associated with increased resistance against oxidative stress and a slowdown of immunosenescence. What are vitellogenin's molecular mechanisms in supporting longevity in the honeybee? We show vitellogenin can shield insect cells against oxidative damage via binding directly to their membrane, and the protein recognizes damaged cells with increased phosphatidyl serine lipid on their surface in a putatively anti-inflammatory manner. We also introduce honeybee Vg as a pathogen pattern recognition receptor that binds to bacterial material, which adds to the current knowledge of honeybee immunity. In a wider evolutionary perspective, vitellogenin is not a honeybee specific protein, but proteins homologous to it are found in most animals ranging from the very primitive ones to humans. Accumulating evidence associates vitellogenin family proteins with immunological and aging-related processes in a range of species. Thus, vitellogenin is one of the proximate molecules in the regulation of lifespan in the honeybee, and potentially in other species.