

Wurst protein plays a crucial role in the molting process of insects

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Tracheal tube clearance is a crucial process during insect molting, ensuring the proper function of the respiratory system as the insect grows. The tracheal system, which is lined with a thin cuticular layer, must shed and renew this lining during each molt to accommodate the insect's expanding body and maintain efficient gas exchange. Although the protein *Wurst* has been implicated in tracheal tube clearance, its potential role in the broader molting process has not been explored. In this study, we show that the *TcWurst* protein is essential for tracheal development during molting in *Tribolium castaneum* and plays a critical role in the molting process itself. The knockdown of *TcWurst* resulted in tracheal collapse, severe molting defects, and lethality at all developmental stages. While the RNAi phenotype of *TcWurst* resembles the defects observed in chitin synthase (*TcChs-A*) knockdown in *T. castaneum*, our findings show that *Wurst* does not significantly affect chitin levels or structure in the cuticle. These results suggest a novel mechanism by which *TcWurst* regulates the molting process through proper tracheal development in insects.