

## Abstract

The cell adhesion molecule (CAM), Echinoid (Ed), is a transmembrane protein on adherens junctions of *Drosophila*. The intracellular domain of Ed contains several important motifs, one of them is Nedd4-binding motif, which is related to endocytosis process. In this study, we found that Ed is involved in the normal replacement of abdominal larval epidermal cells (LECs) with adult histoblasts. This process is an important event happened during metamorphosis in *Drosophila*. At larval stage, the histoblasts are organized in nests and located at lateral sides of each segment. When the embryo reaches pupa stage, histoblast nests will be regulated by various protein signals and proliferate rapidly to expand their territory. At the same time, the original LECs will be pushed away, sink to the basal side and undergo cell death. Finally, all of the abdominal epidermis will be covered by histoblast cells. If we overexpressed the truncated form of *ed* which Nedd4-binding motif was mutated in LECs, a cleft will form in the midline of the dorsal abdomen. There were remaining LECs in the cleft and some of them had zigzag membrane. This results suggest that Ed with Nedd4-binding motif mutated may have problem undergoing endocytosis and accumulate on membranes of LECs, which strengthens the adhesion of them and prevents them from cell death, thus leaving a cleft on epidermis without the covering of adult histoblasts.

## 中文摘要

細胞黏著分子 (cell adhesion molecule) Echinoid (Ed) 是一個穿膜蛋白，位於果蠅的 adherens junctions 上。其在細胞內的結構包含了很多重要的 motif，其中一個就是和胞吞作用的機制相關的 Nedd4-binding motif。在這個研究中，我們發現 Ed 參與了在果蠅蛻皮過程中的一個重要步驟，也就是幼蟲表皮細胞 (larval epidermal cells) 與成蟲組織原細胞 (histoblasts) 之間的交換。在幼蟲時期，胚胎每個體節的兩側都具有組織成巢狀的組織原細胞群，一但進入蛹時期後，這些組織原細胞會受到各式各樣的蛋白質訊號調控，快速的增生並擴張領土，同時原本就存在的幼蟲表皮細胞會受到推擠並往基底方向下沉，最終邁向死亡。最後，腹部所有的表皮細胞都會被組織原細胞取代並覆蓋。如果我們在幼蟲表皮細胞表現 Nedd4-binding motif 被突變的 *ed*，在腹部的背部中線位置會有缺口產生。在缺口當中可以觀察到有剩餘的幼蟲表皮細胞存在，有些細胞的細胞膜還呈現扭曲的型狀。根據這些結果，我們推測 Ed 若在 Nedd4-binding motif 發生突變，可能會使它無法順利被胞吞回收並累積在細胞膜上，加強了細胞之間的黏著性並阻止它們的死亡，因此在表皮留下了沒有成蟲組織原細胞覆蓋的缺口。